Smallholder Agriculture, Livelihood Systems & Food Security: A four-year longitudinal study of Central Malawi

A Thesis Submitted to the Department of Food Business and Development

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In fulfilment of the requirements for the degree of Doctor of Philosophy By

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Declaration

This is to certify that the work I am submitting is my own and had not been submitted for another degree, either at University College Cork or elsewhere. All external references and sources are clearly acknowledged and identified within the contexts. I have read and understood the regulation of University College Cork concerning plagiarism.

Signed,

Gretta Fitzgerald

1st March 2020

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ADMARC	Agricultural Development and Marketing Corporation Malawi
ASWAP	Agriculture Sector Wide Approach
DFID	Department for International Development
FANTA	Food and Nutrition Technical Assistance, USAID
FGD	Focus Group Discussion
FHH	Female Headed Household
FISP	Farm Input Subsidy Programme
HDDS	Household Dietary Diversity Score
HFIAS	Household Food Insecurity Access Scale
MGD	Malawi Growth and Development Policy
MHH	Male Headed Household
MoAFS	Ministry of Agricultural and Food Security (Malawi)
OLS	Ordinary Least Squares
PIPs	Policy, Institutions and Processes (PIPs)
RUTF	Ready-to-Use Therapeutic Food
SAM	Severe Acute Malnutrition
SLF	Sustainable Livelihoods Framework

Chapter 1: Introduction

Background

Globally poverty levels have been declining over the last thirty years. In 2017, an estimated 766 million people, 10.7 per cent of the world's population lived in extreme poverty. This is in comparison to 12.4 per cent in 2012, a reduction of 114 million people - using the international poverty line of $1.90 per day (World Bank, 2017). Much of this progress is attributed to East Asia and the Pacific, though there is a stagnation in places, particularly in Sub-Saharan Africa[1]. Regrettably, when considering the actual number of people living below the poverty line in Sub-Saharan Africa, there was an increase from 276 million in 1990 to 389 million in 2013, an increase of 113 million people (World Bank, 2017).

Poverty is seen as a multidimensional concept and reducing it can be pursued through numerous routes. It has long been recognized that agriculture plays a central role in reducing poverty - given that 75 per cent of the world's poor live in rural areas (Broca, 2002; Alkire and Foster, 2011; Byerlee *et al.*, 2013; Odusola, 2017; Tomich *et al.*, 2018). This is especially the case for African countries such as the Democratic Republic of Congo, Burundi, and Malawi, where over 70 per cent of their rural populations live in poverty.

Agriculture, particularly subsistence agriculture, is the primary source of employment and food for many developing countries. Gollin (2010) estimates that 40.6 per cent of economically active adults are employed in the agricultural sector globally, with this increasing to 54.2 per cent for Africa specifically (Gollin, 2009; cited by Odusola, 2017). Under the right conditions, growth in agriculture in African countries can be much more effective in reducing poverty than growth in other sectors of the economy. One example suggested agricultural GDP growth is 4 times more effective in reducing the $1 a day poverty rate than non-agricultural growth (Lipton and Warren-Rodríguez,

[1] Forty-eight countries out of Africa's 54 countries are considered part of Sub-Saharan Africa. Algeria, Djibouti, Egypt, Libya, Morocco, and Tunisia are excluded from this category (Modi, 2019).

2016). Not only is the agricultural sector crucial for driving economic growth - the 2018 Global Food Policy Report states that increasing the efficiency of agricultural production (i.e. getting more from the same amount of resources) is critical for improving food security (IFPRI, 2018).

While agriculture has long been promoted as a remedy for reducing poverty and hunger, especially in nations where much of the population is engaged in the agricultural sector, there is no consensus as to what that agricultural system would look like for a region or country. In saying this, many actors advocate for the importance of the role of 'smallholder farming' as it is believed to be responsible for a considerable share of the global food production, and accounts for a large share of food consumed in Africa and Asia (Lowder, Skoet and Raney, 2016).

Up until recently, it was widely reported that despite being the most food-insecure sector, smallholder agriculture was responsible for up to 70 per cent to 80 per cent of the world's food production and was key to conserving crop diversity and producing higher volumes of food in comparison to larger farms (Horrigan, Lawrence and Walker, 2002; Badstue *et al.*, 2005; Altieri, 2008; Conway, 2011; Maass, 2013; FAO, 2014; cited by Ricciardi *et al.*, 2018). These figures were reviewed and revised in 2018. Ricciardi et al. built on previous work by Samberg *et al.*, (2016) and Herrero *et al.*, (2017) using either agricultural census data or nationally representative sample survey data from 34 countries, including Malawi. This work found that *"… farms <2 ha produce 28–31 per cent of total crop production and 30–34 per cent of the food supply on 24 per cent of gross agricultural land…"* (Ricciardi *et al.*, 2018, p68). Although a considerably lower estimate than the previous 70-80 per cent, smallholder agriculture still plays a crucial role in rural economies. With this in mind, the Sustainable Development Goal 2.3 (SDG) aims to double the agricultural productivity and incomes of small-scale farmers by 2030. This will, in turn, contribute to the overall SDG2 to end hunger, achieve food security, improved nutrition and promote sustainable agriculture.

SDG2 is an ambitious goal that combines the problems of hunger, food security, and sustainable agriculture in the current context of population growth, climate change, and protracted conflict, political and economic uncertainty at the global level.

Although the SDG2 is ambitious, the issues targeted are not new. The concept of food security predates the current SDGs and is continuously evolving from its origins of food availability and supply in the 1940s to food access through maximum production in the 1980s, arriving at the current iteration that focuses on nutritional quality (Kahsay, 2017).

Until 2016 trends around food insecurity showed positive signs of decline. Unfortunately, since then, figures are showing increases for three years in a row - the number of undernourished people rose from 784 million people globally in 2015 to 821 million in 2016 (World Bank, 2017; IFPRI, 2018, 2019). The worsening figures are being attributed to protracted conflicts, leading to food system failures and the displacement of large populations. This is then exacerbated by climate-related shocks (IFPRI, 2018, 2019).

Undernutrition, one of the leading indicators of food insecurity, is estimated to reduce global GDP by USD 2 trillion per year, which Greenberg and Lee (2013) equate to the total economy of Africa south of the Sahara (Greenberg and Lee, 2013). Malnutrition, in all its forms, is one of the world's most pressing development challenges. It contributes to almost 2.5 million young child deaths annually; it is one of the least addressed problems globally (Greenberg and Lee, 2013).

Despite a much greater understanding of the causes and potential solutions to poverty and food insecurity, for some developing countries like Malawi, rural poverty and malnutrition rates remain stubbornly high. This is being exacerbated by depleting natural resources, population pressure, volatile food prices, and climate-related shocks.

This thesis aims to analyze the role of smallholder agriculture in the reduction of food insecurity and the promotion of overall livelihood improvements. For several years - smallholder agriculture is something that many developing countries, like Malawi, promoted in their economic and development policies. Various supports and interventions have been provided to smallholder farmers, generally with the aim of boosting productivity and incomes - assuming it would have a positive knock-on effect on poverty and food security levels. This body of work will add to the current understanding as to which interventions influence food security levels, and how these interventions fit within the overall livelihood system. These interventions are looked at as agricultural change processes employed to achieve the livelihood outcomes.

Malawi is a relatively small, landlocked country in southern Africa. The preliminary results from the 2018 Population and Housing Census estimated that there is a population of 17,563,749, a 35 per cent increase since the last census in 2008 (National Statistical Office, 2018). It is one of the most densely populated countries in sub-Saharan Africa, with 186 people per square kilometre (National Statistical Office, 2018; World Bank, 2019).

Malawi's annual GDP growth rate was at 4 per cent in 2017, an increase from 2.5 per cent in 2016, and GDP per capita was at US$486 in 2017 (World Bank, 2019). Despite these growth trends, Malawi has the sixth-lowest GDP per capita rate in the world and the lowest amongst its neighbouring countries of Mozambique, Tanzania, Kenya, and Zambia. Their GDP per capita rates are between US$519 and US1,636 (World Bank, 2019).

Agriculture is the backbone of Malawi's economy, employing 84.7 per cent of the population. Despite this high level of dependence on the sector, it only contributes to 26.1 per cent of the annual GDP (World Bank, 2019). There has been notable smallholder-led growth in the agriculture sector over the last ten years, some attributable to the long-running national Farm Input Subsidy Program (FISP) (Aberman, Meerman and Benson, 2018). The origins of FISP stem from a strong political and cultural emphasis on maize and tobacco production since independence. This emphasis has contributed to the development of poorly diversified agroecology and thin markets that are sensitive to smallholder crop production (Ellis, Kutengule and Nyasulu, 2003). Problems are then created as the smallholder sector is a rain-fed system: with one harvest per year, cultivating plots averaging less than one hectare, relatively low levels of inputs and vulnerable to increasingly variable rainfall patterns (Ellis, Kutengule and Nyasulu, 2003; Chinsinga, 2014; Gillespie and van den Bold, 2017a).

Results from Malawi's second and third Integrated Household Surveys (IHS) show marginal signs of decline in the percentage of the population falling below the national poverty line, going from 52 per cent in 2004-05 to 50.7 per cent in 2010-11 (National Statistical Office, 2004, 2012; Greenberg and Lee, 2013). However, Dabalen *et al.* (2017) advise caution around this marginal decline reported due to substantial uncertainty around headcount estimates, the recall period of the questionnaire did not capture the lean season when consumption drops, and poverty increases, and finally how any gains captured in 2010-11 are likely to have been reversed by the large scale floods in 2015 and then droughts and floods in 2016. Food and nutrition security rates are high in Malawi; it is ranked 87th out of 119 countries in the Global Hunger Index with a score of 26.5, a significant decrease from a score of 44.7 (Global Hunger Index, 2018). There have also been decreases in the percentage of children under 5 years who are classified as stunted, going from 48.8 per cent in 2009 to 37.1 in 2015 (FAO, 2019a).

Problem Statement

Global improvements in poverty and hunger have lessened, and in some regions declined - partly due to population pressures, conflict, and climate change. Considering the current context and future forecasts, durable solutions around agriculture must be pursued if its role in improving food security and more resilient livelihood systems are to be realized.

As already outlined, there is a well-recognized assumption that growth in the agricultural sector, especially the smallholder sector, will result in reductions in levels of poverty and hunger; nonetheless, this growth alone is not enough. How can sustainable agricultural growth be brought about? How can growth in smallholder agriculture have a positive knock-on effect on poverty levels and food insecurity, especially for the most marginalized (e.g. women and youths)?

Agriculture, poverty reduction and food security are inextricably linked. Gaining an understanding of how, or what can stimulate these links to bring about positive change is essential. For countries like Malawi, it would be valuable to gain an insight into how policy interventions (like its social protection program FISP and extension supports) are utilized within the smallholder livelihood system, and how these interventions can influence food security and broader livelihood outcomes.

The literature includes a variety of explorations of how agriculture can influence poverty reduction and food security, especially nutrition-related outcomes. There is some variance in thinking, but there is agreement around four main impact pathways. These are agriculture for food production, agriculture for income, agriculture as a moderator of women's time-use and decision-making power, and agriculture as a moderator of food markets. Each of these pathways exhibits how agriculture can influence what type, how much, and from where food is consumed (World Bank, Hawkes and Ruel, 2007; Arimond *et al.*, 2011; Gillespie and Kadiyala, 2012; Hoddinott, 2012; Ruel and Alderman, 2013; Carletto, Corral and Guelfi, 2016; Aberman, Meerman and Benson, 2018).

Research Aim, Objectives & Questions

This thesis provides a detailed analysis of the livelihoods system and agriculture change processes employed by rural households in central Malawi from 2010 to 2013. Its main aim is to explore livelihood changes in smallholder agriculture and food security. This will provide substantial insight into how different components of the livelihood system and the supports provided to households influence critical indicators of food security and asset ownership, thus adding to the current body of knowledge and will inform policy and program design.

The specific objectives of the research are:

1. To analyse the livelihood systems of the studied households across three districts in central Malawi and how these systems differed by gender and over time.
2. To determine if there were any changes in the food security and asset ownership in households over the study period and to establish how gender and levels of asset ownership influence disparities.
3. To identify what household characteristics and livelihood strategies influence food security and asset ownership.

4. To establish what agricultural change processes were available to the studied households and how these were used, by male and female-headed household.
5. To assess if the agricultural change processes used influences the food security and asset ownership outcomes of the studied households.

To address the first objective, analysis was conducted on the types of human, natural and economic capital assets available to households and how these were used to pursue their livelihood strategies. The context of vulnerability and gender inequality was also explored to fully understand the challenges the households faced over the study period.

The second objective addresses the food security and asset ownership of the studied households, and how this differed over time and by gender of the household head. Two different types of food security variables are used, and a household asset score variable is calculated. Correlation analysis is used to explore the relationships between each of these variables.

The third objective brings the livelihoods system, the food security, and the household assets scores together with the aim of understanding and analysing how components of the livelihood system influence food security and asset ownership.

The fourth objective establishes what agricultural change processes were available to the studied households, with the aim of understanding what policies, processes and institutions were utilised at the household level.

Building on the fourth objective, the fifth analyses whether the agricultural change processes employed influenced the food security or asset ownership levels of the studied households. This may help to further the understanding of the effectiveness of similar change processes in the pursuance of improved food security and poverty levels.

To inform these five objectives, the following set of research questions were used to guide the literature review, data analysis and write up of findings:

1. What assets do households utilize to pursue their livelihood strategies? Does this differ by the gender of the household head?

2. Were there any significant changes in the household's food security and asset ownership over time? How does this differ by gender of household head and levels of asset ownership?
3. How do household characteristics and livelihood strategies influence food security and asset ownership outcomes?
4. Over the study period, what agricultural change processes were utilized by households? How do these differ by gender of household head and levels of asset ownership?
5. Did the agricultural change processes that were utilized by households influence their food security and asset ownership?

The four-year longitudinal study included an annual household questionnaire, from 2010 to 2013, sampling 195 households from 46 villages across three districts in Malawi's central region - Lilongwe, Mchinji, and Salima. This questionnaire included: demographics, health, access to water and sanitation, asset ownership, crop production, input use, production decision making, livestock ownership, and sales, other sources of income, household consumption, shocks experienced and responses, savings and credit, and food security. Qualitative data collected through focus group discussions, semi-structured interviews, and observation during the final two years of the study are included (i.e. 2012 and 2013).

By using four annual longitudinal datasets, trends over time are shown. Throughout the thesis, results are disaggregated by male-headed and female-headed households. This is core to the analysis, as it is widely accepted that such social relations inevitably govern the distribution of resources, income, and division of labour and dynamics of consumption (Scoones, 2009).

Research Background

The thesis stems from a four-year research project carried out by University College Cork on behalf of the not for profit organization - Valid Nutrition (Fitzgerald and FitzGibbon, 2014; Dalzell, 2015; Fitzgerald, 2015). It builds on the research project findings by answering the questions outlined in the previous section. The following is a brief description of the original research project, the research partners and their roles in the research process.

Valid Nutrition develops and manufactures innovative food products to address malnutrition and has been locally producing ready-to-use foods (RUFs)[2] in Malawi since 2009. To date, their primary product is a groundnut based ready-to-use therapeutic food (RUTF). The World Health Organisation has recommended the use of RUTF for treating severe malnutrition acute (SAM) since 2007 (Segrè, Liu and Komrska, 2017). Valid Nutrition's main objective is to advance the treatment and prevention of acute and chronic malnutrition by manufacturing high-quality RUFs in a country with high levels of acute malnutrition (e.g. Malawi). Its operations are guided by the principal idea that if *"...it supports and strengthens the local food supply chain through its procurement of raw ingredients from small-holder farmers and other suppliers, expanding the local know-how on the manufacture of quality nutritious foods and reducing the environmental footprint, as the products are used locally where need is high*" - then they will maximize the social and economic returns (Valid Nutrition, 2018).

There is substantial demand for RUTF, considering that globally, 7.3 per cent (49.5 million) of children under five years of age are suffering from severe acute malnutrition (FAO, 2019b). 21.9 per cent (148.9 million) of children are also suffering from chronic malnutrition, who would benefit from other forms of ready-to-use supplementary foods (RUSF) (FAO, 2019b). RUTF is produced predominantly outside of the countries where it is used. Some RUTF is produced locally, near the intended users, but most is still produced offshore and shipped to countries where it is consumed (Segrè, Liu and Komrska, 2017). Since the WHO endorsed the use of RUTFs

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[2] RUFs consist of a variety of lipid-based foods with low water content, providing a long shelf life and safe consumption out of the package, thereby facilitating effective community-based management. The original peanut based RUTF which was designed to treat severe acute malnutrition, evolved into a variety of products supplementary foods which are lipid-based, but to vary levels, and designed for both the treatment and prevention of severe, moderate, and chronic malnutrition (Segrè, Liu and Komrska, 2017).

for the treatment of malnutrition in 2007, there has been debate around whether it should be produced offshore, locally or both (Segrè, Liu and Komrska, 2017). To date, the global RUTF market has been highly concentrated. It is estimated that half the global supply of RUTF comes from one company, Nutriset, a French-based producer of the trademarked Plumpy'Nut. Furthermore, the United National Children's Fund (UNICEF) is the largest purchaser of RUTF procuring 36,000 MT of peanut-based RUTF in 2017 (UNICEF, 2017). Although UNICEF is supportive of local production and has reported that their supplier base has increased substantially since 2007, procuring RUTF from 23 different suppliers in 2017, 18 of these suppliers are producing in countries that have high levels of malnutrition (UNICEF, 2017). Segrè, Liu and Komrska (2017) attribute this transition from offshore to local production to the growing recognition of the importance of food security within the countries most affected, as well as perceived advantages of local production. They give several examples of advantages: long-term cost reduction, increased availability, economic benefits to farmers and manufacturers, customization to locally available ingredients, preferred tastes, and distribution channels. The transition to local production has contributed to the production of greater volumes of RUTF, increased competition, and supplier diversification, thus bringing down the average prices per carton by 23% since 2008 (UNICEF, 2017). However, the production of RUTF and other types of RUF's are still more costly to produce locally than offshore due to the cost of importing raw materials, import duties, unfavourable local taxation, production capacity and factory utilization, cost of credit, and limited access to quality assurance testing facilities (Segrè, Liu and Komrska, 2017; UNICEF, 2017).

Valid Nutrition initiated the original research project in 2009 with the aim of investigating the viability of its own local RUF model. The primary purpose of the study was to establish a comprehensive analysis of the impact on farming household livelihoods of their market-led intervention – a guaranteed groundnut purchasing scheme.

The study was undertaken by University College Cork in collaboration with Valid Nutrition's local partner ExAgris Africa. ExAgris is one of the largest cropping and livestock businesses in Malawi who cultivate around 7,000 hectares of land on their 14 estates, specializing in - seed production, export crops, and agro-processing. The agri-business also implements an out-grower scheme focusing on paprika, chillies and groundnuts. As of 2018, the out-grower scheme involved up to 15,000 smallholder farmers across Malawi (ExAgris, 2018).

A proportion of the farmers sampled in the study were participating in the previously mentioned Valid Nutrition/ExAgris Africa market-led intervention. These farmers would have received agricultural extension services through local associations located on the periphery of ExAgris estates. Another proportion of the sample includes farmers that did not participate in these associations but lived on the periphery of the same estates.

By committing to a longitudinal research design, it was intended that as the groundnut purchasing scheme evolved, the research project would be able to track the progress of the participating farming households. A four-year sequential mixed-method study allowed for an in-depth insight into the strengths and weaknesses of the purchasing scheme and what the barriers were for participating farmers. The main benefit of the study was that Valid Nutrition could use results to add to its case and advocate for local production of RUTF as it was showing increased market demand for high quality, aflatoxin free groundnuts. There were a number of positive knock-on effects, for example; cash crop diversification, increased availability of protein-based foods, and increased use of nitrogen-fixing crop that contributes to soil health.

Structure of the Thesis

This thesis is made up of eight chapters in total. Chapter one provides a brief background on global poverty and food security trends over the past thirty years. Following this, the occurrence of rural poverty and the role of smallholder agriculture is explored and how concepts around these issues have evolved. The main argument is explained in the format of a problem statement and followed up with an outline of the research aims, objectives, and questions.

Chapter two provides a detailed review of the literature linked to livelihoods, smallholder agriculture, food security, and poverty reduction. How the thinking around these topics evolved and influenced policy and practise is discussed.

Chapter three provides a political economy analysis of the literature focused on the studied country Malawi. Included in this is a detailed review of poverty, food security, and rural development policies and trends.

The methodology guiding the entire study is outlined in chapter four. This chapter begins with a presentation of the conceptual framework designed, based on the literature reviewed. The framework shows how smallholder farming household livelihoods are linked to food security and poverty reduction outcomes. Following this, the study area, sampling design, village, and household selection process is described. A detailed outline of the specific methods employed throughout the study is provided, including what data collection tools were used and the study ethics considered. An overview of the data analysis and statistical tests carried out is given, coupled with, a description of the main outcome variables employed in the study, and some background on their origin and use in other studies.

Chapter five is the first of three results chapters. This chapter presents the results of a detailed analysis of the assets available and livelihoods pursued by the studied population. The results are presented to show both trends over the study period and differences between genders, specifically the gender of the household head. The vulnerability of households is investigated by looking at the shocks experienced by households and their response mechanisms. The vulnerability is explored further by looking at the household decision making processes around key livelihood activities.

Chapter six is the second results chapter; here, the analysis of the key livelihood outcome variables is presented and discussed. These variables represent food security and poverty status outcomes at the household level. The household asset score is used to investigate the changes in household poverty status over the study period. The main domain of food security analyzed was food access. Two well-recognised indicators were utilized for this; the household food insecurity access scale (HFIAS);

and the household dietary diversity score (HDDS). Correlations between the outcome variables over the study period are presented, along with a regression analysis of the factors that influenced food security and household assets scores, such as household characteristics and livelihood strategies pursued.

Chapter seven is the final chapter that presents results from the study. This chapter investigates the links between specific agricultural change processes employed by the study population and how this influenced their poverty and food security outcomes in the final two study rounds. The agricultural change processes investigated are production diversity, market access, external supports, and uptake of technology in production.

Finally, chapter eight summarises the main findings of the thesis by revisiting the research objectives and questions whilst considering the previous chapters that explored the livelihoods, food security and poverty status of the studied households. A summary of the key trends over time, gendered differences and the implications of these are presented. This chapter provides some key recommendations for policy, practice and future research.

Chapter 2: Smallholder Agriculture & its Relationship with Food Security

Over the past three decades, there have been positive results in poverty reduction and food security. Nevertheless, rural poverty and undernutrition are still considerable challenges for many developing countries. Economic growth, particularly around agriculture, does contribute to improvements in these issues; the linkages between agricultural, poverty reduction and food security are widely accepted. However, understanding what agricultural change processes contribute most effectively to poverty reduction and food security in specific contexts is unclear.

This chapter provides a review of the literature around food security, the sustainable livelihoods framework, and the role of policies, institutions and processes (PIPs). Following this, the study's conceptual framework, informed by the literature, is described at the end of this chapter.

The Evolution of the Concept of Food Security

In 1992 it was estimated that there were over 200 definitions of food security in published writings, with many more added in the last almost three decades (Ingram, 2011; FAO, 2016a). Currently, the most widely cited definition of food security in the literature is *"… when all people, at all times, have physical, social and economic access to sufficient, safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life"* (FAO, 2009; Ingram, 2011). The international community agreed on this iteration at the 1996 World Food Summit. It is an accumulation of many iterations of significant reports, international convening, and lobbying to policymakers, to bring a better understanding and approach to the food security challenge.

Food security, as a concept, is flexible and multi-dimensional. There have been significant revisions, not only of the wording of the definition, but political thinking and policy responses have also evolved since the issue of global food supply was first tabled at the historic 1943 Hot Springs Conference of Food and Agriculture. Although the original concept of food security did not emerge until the 1970s, it was at the 1943 conference where the concept of a *"…secure, adequate, and suitable supply of food for everyone"* was accepted at an international level (Gross *et al.*, 2000).

In the 1940s, the focus was on food supply in terms of assured availability and stable prices of essential food items (FAO, 2016b). Bilateral agencies representing wealthier western nations like the US and Canada began to dispose of their surplus agricultural commodities to food-insecure nations (Gross *et al.*, 2000). It was not until the 1960s when policymakers acknowledge that food aid in the form of dumping surplus agricultural produce, often as a result of inefficient subsidies, was damaging local economies and creating a barrier to self-sufficiency. As a result of this, the World Food Program (WFP) was established in 1963 (Gross *et al.*, 2000).

However, after 25 years of positive trends in global food production, the 1970s began with a reverse in those trends. The declines were attributed to adverse weather conditions in the U.S.S.R., China, India, Australia, the Sahel regions, and South-East Asia, along with policy adjustments in the U.S. that aimed to reduce large surpluses as a result of agricultural subsidies (UN, 1974). There was also a realization that the technical success of the Green Revolution did not automatically lead to significant reductions in the level of poverty and malnutrition (FAO, 2016b).

These events were viewed as the turning of a crucial corner in the 1974 World Food Conference. This conference proved to be pivotal itself; it gives an insight into how the global policy thinking had matured, so much so that proposals for the eradication of hunger and food insecurity were formalized (UN, 1974). Specific recommendations were made by the secretariat which included: the setting of specific food production targets, more significant policy and financial support for agricultural and rural development, reforms around the world fertiliser policy, expansion of international research and technology programmes for developing countries, a consolidated resolution on nutrition programmes and policies, the establishment of international food information and early warning systems, reaffirmation of the collective responsibility of the international community in ensuring food security, improved coordination of food aid policies and programmes, price stabilization to ensure greater stability, and lastly improved trading arrangements to increase the food import capacity of developing countries (UN, 1974).

Along with this ambitious list of recommendations, the conference concluded with the Declaration on the Eradication of Hunger and Malnutrition; *"Every man, woman and child have the inalienable right to be free from hunger and malnutrition in order to develop fully and maintain their physical and mental faculties"* (UN, 1974).

With the more holistic food security definition from the 1974 conference came improved policies and programmes. Building on this, in the 1980s there was the promotion of poverty alleviation, and the acknowledgement of the role of women in ensuring food security, and recognition of the impact a decline in purchasing power can have on vulnerable groups of people (Gross *et al.*, 2000). A more nuanced understanding of food insecurity also evolved, with the 1986 World Bank report "Poverty and Hunger" where distinctions between chronic food insecurity and transitory food insecurity were made (FAO, 2016b). Chronic food insecurity was associated with issues of continued or structural poverty and low incomes (FAO, 2016b). Transitory food insecurity was associated with periods of intensified pressure caused by natural disasters, economic collapse or conflict (FAO, 2016b).

Building on the advances in thinking from the 1974 conference, the 80s saw further refinement as a result of the works of Per Pinstrup-Andersen (1981) and Amartya Sen (1982). Pinstrup-Andersen catalysed the consideration of nutrition in agricultural policy and decision making, whereas Sens' (1982) thinking around entitlement. Specifically, food entitlement eschewed the use of the concept of food security as being about access, and more about the entitlements of individuals and households (Pinstrup-Anderson, 1981; Sen, 1982; FAO, 2016b; Kahsay, 2017). Following this, along with other notable advances in the writing and policy responses around food security, the next defining moment for the food security movement was during the 1996 World Food Summit.

During the 1996 World Food Summit, a somewhat more complex definition was proposed *"Food security, at the individual, household, national, regional and global* *levels [is achieved] when all people, at all times, have physical and economic access to sufficient, safe and nutritious food to meet their dietary needs and food preferences for an active and healthy life"* (FAO, 2016b). Although the definitions themselves grew increasingly broad, turning into statements of common goals and implied responsibilities, the pragmatic responses narrowed. The international and national focus was around how to organise public action and to focus the international development policy discourse much more around poverty reduction and elimination (FAO, 2016b). The 1996 World Food Conference is said to exemplify this direction of policy by setting the primary objective of international action on food security on halving the number of hungry and undernourished people by 2015 (FAO, 2016b).

This thinking was further ingrained in the early 2000s when the '*productionist policy'* paradigm was forged by the likes of the FAO (Lang and Barling, 2012). The hypothesis was that production would increase if there were better land management, advances in agricultural technology and innovation, and more significant investment. This would result in reduced food prices, leading to improved availability of and access to food. Unfortunately, this hypothesis was not unlike that of the early 20th-century thinking outlined earlier (Lang and Barling, 2012). This hypothesis was championed through the United Nations Millennium Development Declaration, which outlined eight Millennium Development Goals (MDGs). The first goal recommitted to previous targets mentioned earlier by halving hunger and extreme poverty rates by 2015 (FAO, 2015b).

Consequently, it was not long until this hypothesis was put to the test by the 2007/2008 food crisis. At the time the world economy was booming, then the deflation of the banking bubble sparked the 2007/08 food price spike. The crisis was viewed as primarily one for developing nations that was being exacerbated by the new incentivised bio-fuels markets in the US and EU (Lang and Barling, 2012).

The FAO reported that by the middle of 2008 real food prices were approximately 64 per cent above their 2002 levels, making them the highest in 30 years (FAO, 2008; cited by Ingram, Erickson and Leverman, 2010). As a result, access to food declined as the purchasing power of millions of vulnerable people weakened. FAO estimates that an additional 40 million people became 'chronically hungry' in 2008 due to the food price increases and another 100 million people due to the global economic crisis, bringing the total number of people classified as undernourished to over 1 billion million people in 2009 (FAO, 2008; cited by Ingram, Erickson and Leverman, 2010).

There have been many studies that tried to analyse the causes and impacts of the 2007/08 food crisis, many of which report that although the increased demand for biofuels contributed significantly to the crisis, it was not the primary cause. Analysis suggests that the global food system was already under stress with dramatically increased food prices between 2007 and 2008 - creating what some call the 'perfect storm' threatening the food security of millions of people around the world (Evans, 2008; Ingram, Erickson and Leverman, 2010; Lang and Barling, 2012).

Ingram, Erickson and Leverman (2010) reviewed numerous studies of the food price crisis and summarised the leading causes of the crisis reported. The first cause reported was the production declines in important exporting regions due to extreme weather events, as mentioned briefly earlier. Markets grew concerned about the risk of climate changes and responded with price increases (Ingram, Erickson and Leverman, 2010). The second cause reported was the falling stocks, thus, reducing the buffer against production shortfalls, which created uncertainty around the reliability of supply. This increased market volatility (Ingram, Erickson and Leverman, 2010). Biofuels were the third cause of the food price crisis, which received much criticism as the price trends increased. Market demand for sugar, oilseeds, palm oil and maize increased, which then caused heightened prices and diversion of land to the production of biofuel crops. The demand for biofuels was an attempt to substitute greenhouse-gas-emitting fossil fuels and was supported by government policy in places such as the EU, US, Indonesia, and Brazil. The estimated influence of the shift to biofuel production on global food prices ranges from 5 per cent to 50 per cent. However, most estimates are around 30 per cent (Ingram, Erickson and Leverman, 2010). A fourth reason for the food price increase was the trade policies that attempted to protect the most vulnerable populations and in response to political pressure, some countries-imposed export restrictions. These restrictions are thought to have exacerbated the overall supply problems and distorted production incentives (Ingram, Erickson and Leverman, 2010). The final reason listed was the occurrence of financial speculation which came with the arrival of new investors in the commodities markets who responded to rising food prices with speculations in futures and options. This is thought to have not only increased prices but also caused the increases to persist and become volatile (Ingram, Erickson and Leverman, 2010).

One of the first multilateral actions was the convening of a High-Level Task Force by the UN Secretary General. The main objective of this task force was to develop a 'Comprehensive Framework for Action'. This was then presented at the High-Level Conference on Food Security and the Challenges of Bio-Energy. The focus of this framework was on the immediate symptoms and problems faced by the nations most at risk during the crisis, which were predominantly developing countries (Lang and Barling, 2012).

Thus, the cause of the food price crisis was complex, intertwined and far-reaching. Disappointingly the UN system was ill-prepared for it. The framework recommended by the High-Level Conference on Food Security included four main actions: international commitments for emergency funding for relief and food aid, improved information management systems for food production and national food stocks with the aim of strengthening early warning systems, refocusing and agreement around a funding mechanism for the promotion of agricultural technology - something that was previously agreed during the G8 L'Aquila food summit, and finally the reactivation of the role of civil society in the global governance forum (Lang and Barling, 2012). The similarities between these four recommendations for a food crisis in 2007/08 and the recommendations for actions to a food crisis in the early 1970s listed earlier are disappointingly similar.

Despite these similarities in the responses to the food price crisis, some see 2008 as a point of departure for the food security discourse. The literature appears to have increased focus and references to issues like the nutrition transition, hidden hunger, and resilient food systems. This is encouraging because as the global policy transitioned from the Millennium Development Goals (MDGs) to the Sustainable

Development Goals (SDGs) in 2015, the food system was still under severe pressure from issues like climate change, urbanisation, globalisation, population increases, disease, protracted crisis, and changing patterns of food consumption (Misselhorn *et al.*, 2012).

The world produces more than enough food to feed its population. The problem of food insecurity and hunger is no longer a production one; it is a political and social problem (Ingram, 2011; Misselhorn *et al.*, 2012). In recent years there has been growing understanding around global environmental change challenges, and how interconnected this is with our increasingly globalised food systems (Ingram, Erickson and Leverman, 2010; Misselhorn *et al.*, 2012).

Climate change, biodiversity loss, water scarcity, pollution, population pressure and other environmental factors, are collectively termed as 'global environmental change' (GEC). Developing countries are expected to be most affected by the anticipated impacts of GEC, especially climate change (Misselhorn *et al.*, 2012). By taking a food system approach to policy, the activities of food producers, processors, distributors, retailers, and consumers involved in the entire system, are considered. All these activities should be viewed as dynamic and interacting processes embedded in social, political, economic, historical and environmental contexts (Ingram, Erickson and Leverman, 2010).

Along with the food systems approach, by ensuring that a resilience lens is incorporated into the food system thinking, the ability of actors, institutions, and/or processes involved in the food system to withstand shocks and stressors, and how they can recover from such would be considered (Vaitla *et al.*, 2012). After the 2011 and 2012 regional food crisis in the Greater Horn of Africa and the Sahel resilience programming has become an essential concept for humanitarian and development actors working in chronically vulnerable, food-insecure areas (Vaitla *et al.*, 2012). At the root of it, the concepts of 'resilient food systems' is closely related to that of the sustainable livelihoods concept, but operating across multiple levels and scales with a greater emphasis on the ability to cope with, and recover from shocks and stressors (Vaitla *et al.*, 2012).

Gender Inequality and Food Security

The linkages between gender inequality and food insecurity have become well recognised in global and national agriculture, food security and nutrition discourses (Smith *et al.*, 2002; FAO, 2011a; Verhart *et al.*, 2015; Agarwal, 2018; Galiè *et al.*, 2019; Larson, Castellanos and Jensen, 2019), particularly in the case of poor and marginalised women who have less access than men to productive livelihood assets (Galiè *et al.*, 2019). The FAO (2011) estimated that women make up 43 per cent of the agricultural labour force in developing countries, with this being as high as 80 per cent for some countries in sub-Saharan Africa. Therefore *"The vast majority of food production that is attributable to women makes them the principal agents of food security and household welfare in rural areas*" (FAO, 2011b; cited by Verhart *et al.*, 2015)

There is an assumption that if women have similar access to productive livelihood assets to men, then agricultural production will increase, thus contributing to enhanced food security. The same FAO (2011) report cited by Verhart *et al.* (2015) and Galiè *et al.* (2019) also estimates that if women had the same access to productive resources as men, their farm yields would increase by up to 30 per cent, with total agricultural output rising by up to 4 per cent. This would have the potential knock-on effect of lifting between 100 million to 150 million people out of food insecurity.

Women play a critical role in both the household and national food security, as food producers, food managers and food consumers. When women can actively participate or lead in decision-making processes around the production and utilization of food, there are improved food and nutrition security outcomes for both the children and women in the households (Smith *et al.*, 2002; FAO, 2011a; Verhart *et al.*, 2015; Agarwal, 2018; Galiè *et al.*, 2019; Larson, Castellanos and Jensen, 2019). Therefore, women's empowerment is seen to have significant implications on food and nutrition security and is considered as an essential pathway for improved nutrition when implementing agricultural programmes (Verhart *et al.*, 2015; Larson, Castellanos and Jensen, 2019)

Verhart et al. (2015) outline three ways in which women's empowerment leads to better developmental outcomes, in particular, nutritional outcomes. Firstly, *"women's empowerment leads to a greater influence of women at the household level, for example, in terms of how income is used. The assumption is that women, in their role as main caregivers, spend a higher percentage of their income on food, health and care, which leads to nutrition security."* Secondly, *"women's empowerment leads to an improved nutritional status of women themselves, for example, due to workload changes or due to more influence over household income, which means that they have healthier pregnancies and have more resources to care for their children."* Thirdly, *"women's empowerment leads to an increased influence on how they use their time. The assumption is that this will lead to more time being allocated for feeding their babies and for ensuring young children are healthy"* (Verhart *et al.*, 2015, p8).

However, the concept of women's empowerment has its limitations as it narrows interventions and focuses on the individual capacities of women in the context of their current roles and positions within their households. Meanwhile, the barriers and norms that exist within the household, community or wider society or political economy are left unchanged. Galiè et al. (2019) go as far to say that designing interventions that link women's empowerment to food security and nutrition through improved access to productive resources has so far largely failed to deliver on its objectives. Therefore, for women's empowerment to be effective, policies and interventions need to be broader and address the norms, institutions and broader political economic structures that (re)produce gender in-equalities in the first place (Galiè et al., 2019) With this, the roles of both women and men cannot be looked at in isolation or taken for granted. How these gender roles are interlinked and influence each other has been given limited consideration in the context of food and nutrition security.

Women's ability to contribute effectively to agriculture is dependant on their access to land. However, women are significantly disadvantaged in this respect due to male bias in inheritance laws, land markets and government land distributions. Women also have substantially less access to credit, irrigation, fertilisers, technology, and information on new techniques, weather and market prices (Agarwal, 2018). These disadvantages that women face in agriculture are multiplied when climate change is considered since they are less likely to have access to early warning information or new technologies like drought-tolerant seeds, practices that could assist them in adapting or mitigating climate risks.

A likely driver of these inequalities is the perception that women's role in subsistence agriculture is frequently seen as an extension of their domestic tasks. Tasks that are predominantly seen as women's include laborious work like plot preparation, weeding and post-harvesting processing, food preparation, fuel and water collection and the many other tasks that fall under a women's remit in the household. The time consumed by these tasks and the lack of recognition of this is said to influence women's capacity to adequately care for themselves or their children which affects their role in nutrition security (Verhart *et al.*, 2015). Finally, when it comes to actual food consumption, existing gender norms influence food distribution in the household. Studies have found that women in relatively well-off households can still be food insecure and are malnourished because of the way food is shared and distributed and women's lack of influence to claim their share (Verhart *et al.*, 2015).

Sustainable Livelihoods and the Evolution of the Livelihoods Framework

The theory around livelihoods emerged in the early 1990s as the concept of food security evolved into the more nuanced and holistic understanding that we use today. There was strong advocacy for programme interventions and policy to not only factor in food security but also consider how food security can be pursued through the promotion of more sustainable livelihoods (Chambers and Conway, 1991; Scoones, 1998; Ashley and Carney, 1999; Levine, 2014; Bhatasara, Chiweshe and Helliker, 2018). The livelihoods framework dominated rural development research and interventions for most of the 1990s and 2000s. Development agencies such as the UNDP, Oxfam, CARE and others were adopting the framework for contextual analysis and intervention design, monitoring and evaluation. The origins of this framework can be directly linked to the work by Chambers and Conway (1991), who began to coin the notion of sustainability in the framework. Also, it is worth noting that livelihoods thinking can, although indirectly, be linked back to Sens' (1982) theories around entitlement.

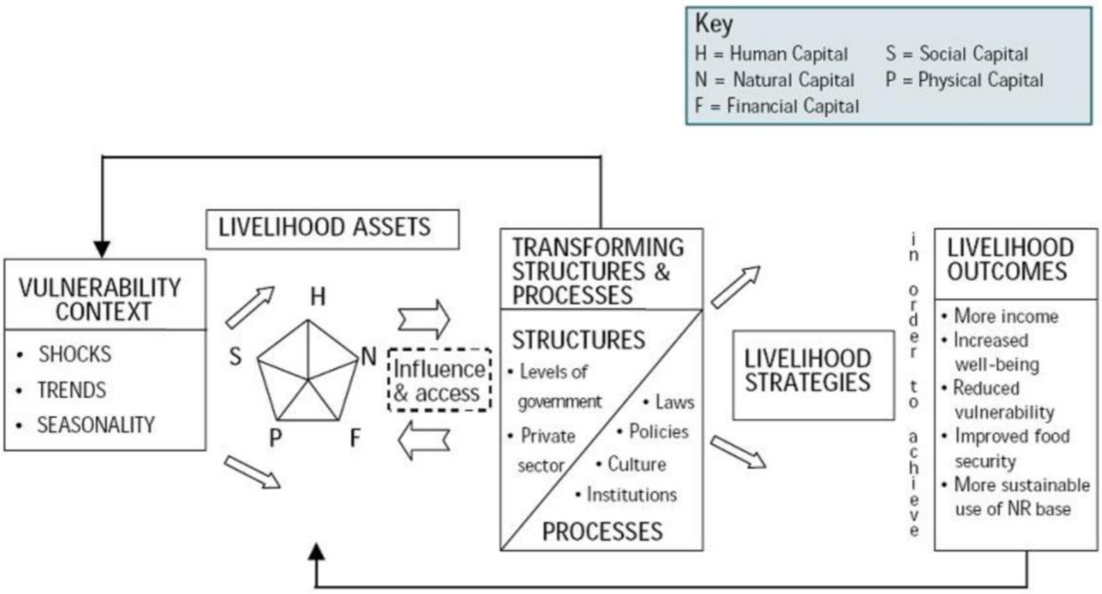
Initially, the framework was mainly used for rural livelihoods, but as it grew in popularity, it was adapted to different contexts, for example, urban development (Bhatasara, Chiweshe and Helliker, 2018). Insights gained from work around food security, equality, agro-ecology sustainability, and the diversification of livelihood strategies fed into the development of the livelihoods framework (Scoones, 1998; Ashley and Carney, 1999; Ellis, 2000; Bhatasara, Chiweshe and Helliker, 2018).

A vital characteristic of the livelihoods framework is that it is people-centred, viewing people as active agents in their livelihoods, making their own choices and devising their livelihood strategies with the resources available to them in their specific context (Levine, 2014). The framework is cited for contributing to a more holistic and integrated understanding of how people make their livings under adverse and shifting conditions, by highlighting the choices they make within a context of numerous risks and vulnerabilities (Levine, 2014; Bhatasara, Chiweshe and Helliker, 2018).

Figure 1 shows the most commonly used sustainable livelihoods framework. There are numerous diagrammatic iterations of the framework; this one came from the (1999) DfID *Sustainable Livelihoods Guidance Sheets* which built on the previous work by Chambers and Conway (1991). The framework outlines three interconnected components of a livelihood that are used to pursue livelihood strategies which ultimately contribute to the livelihood outcomes. These three components are the vulnerability context, the five livelihood assets (sometimes referred to as capitals), and the transforming structures and processes (sometimes referred to as policies, institutions and processes, PIPs). Using the framework, an individual, household, or community, can be viewed as having access and control over a variety of assets. Transforming structures and processes influence the assets people have available to them and how they utilise them within their context and vulnerabilities. In order to achieve livelihood outcomes, people, through their livelihood strategies, need to accumulate and ensure a return from livelihood assets within the vulnerability context. It is important to note for one individual or household there can be numerous livelihood strategies - some seasonal, some only used in times of dire need, or in times of plenty. It must be noted that, livelihood strategies are often not cash based, thus making an estimation of the monetary value of returns challenging. A 'sustainable livelihood' is achieved when the livelihood strategies do not undermine the natural resource base and can cope and recover from shocks and stresses (Bhatasara, Chiweshe and Helliker, 2018).

Everyday use of the livelihoods framework was to examine people's current livelihoods and then identify what enhancements could be made through policy adjustment and development interventions (Morse, McNamara and Acholo, 2009; Bhatasara, Chiweshe and Helliker, 2018). Also, in practice, the framework can be used to gain a better insight into how the context influences livelihoods. This can be done by looking at annual food security status and asset ownership and then examining the specific shocks experienced by individuals and groups, what the annual price and food availability trends are, and how this fluctuates seasonally (Levine, 2014).

Figure 1: Sustainable Livelihoods Framework (DfiD, 1999)



Nevertheless, the livelihoods framework has not gone without criticism. Levine (2014) notes that one of its weaknesses was that in practice too much focus was put on explaining what fell into each of the categories rather than attempting to understand what went in between these categories, more commonly referred to now as the 'feedback loops'. This over categorisation can then run the risk of trying to do too much. Studies that have set out to describe the vulnerability context and PIPs that shape livelihoods end up too superficial to provide any useful insight into the specific factors that influenced the livelihoods of different groups of people (Levine, 2014). The framework lost popularity due to this and to the perception that it was rooted in development practice, rather than research (Levine, 2014).

Another significant critic is Bhatasara, Chiweshe and Helliker (2018) who cite Scoones (2009) and Sakdapolrak (2014) on how livelihood studies lacked extensive analysis of long-term social changes, politics, power, shifts in rural economies, and agrarian change. This builds on Scoones (2009) argument that the lack of consideration for longer-term change means that issues like climate change and variation around temperature and rainfall patterns have been missing in most livelihood analysis (Bhatasara, Chiweshe and Helliker, 2018). By having a livelihoods analysis that is focused on the current circumstances without looking at the likely influence of historical trends and events, the longer-term ability of livelihood systems to adapt and absorb shocks and stresses is compromised (Scoones, 2009; Bhatasara, Chiweshe and Helliker, 2018). Despite this weakness, there appears to be a rejuvenated interest in the livelihood framework with the emergence of resilience programming.

There are numerous strengths and lessons learnt from the application of the livelihood framework that can make it a useful framework for analysis. Some authors see the livelihoods approach as a useful tool for political economy analysis because it looks at how people's opportunities and choices are shaped by the broader structures in the society in which they live (Levine, 2014; Bhatasara, Chiweshe and Helliker, 2018). Within the development sector, there is an acknowledgement that people's wellbeing and how it is achieved and maintained cannot be understood by a technical, market-based analysis of how people earn an income. There is a demand for insights into the institutional, political, ecological, social or cultural reasons that are driving change and how these differ between groups (Levine, 2014; Bhatasara, Chiweshe and Helliker, 2018).

Others authors are interested in designing studies that employ more long-term longitudinal methods that factor in seasonality and the trajectories of the various components of people's livelihoods (Maxwell *et al.*, 2013; Levine, 2014). Maxwell *et al.* (2013) employed the livelihoods approach in a cyclical way using seasonal longitudinal data that allowed the study to show the impact of various forms of vulnerability much more explicitly than that of previous studies. This study exemplified how by exploring the 'feedback loops' mentioned earlier, one can understand how one short term outcome influences the next short-term decision or action.

With its strengths and weaknesses, by modifying the framework to meet a study's needs, and using it as a starting point, the framework allows for an integrated analysis of complex, highly dynamic, rural contexts (Scoones, 2009). Specifically, in this study, it acts as a useful conceptual framework, ensuring that the key factors influencing the livelihood strategies of rural farming households and how these influence their livelihood outcomes can be explored and presented.

Smallholder Agriculture as a Livelihood Strategy

Smallholder agriculture is a key livelihood strategy for rural development; it is defined as *"…marginal and sub-marginal farm households that own or/and cultivate less than 2.0 hectares of land*" (FAO, 2001; cited by Modi, 2019). The choices a household makes, together with the livelihood strategies they implement, in turn, generate their means for survival (Ellis, 2000; cited by Kahsay, 2017). Asset ownership, returns on assets, purchasing power, and access to supporting structures, associated risks and uncertainties influence the livelihood strategies households pursue. Dorward *et al.* (2013) proposed the categorisation of three broad types of livelihood strategies. The first being 'hanging in', defined as being where assets are held, and activities are engaged in to maintain livelihood levels in the short term, however often in the face of adverse socioeconomic circumstances. The second category is 'stepping up' where there is an investment in assets to expand current livelihood activities, with the aim of increasing production and income to improve the overall livelihood in the medium term - an example given is the accumulation of productive dairy livestock. The final category is ‘stepping out’, defined as a livelihood with existing activities that are used to accumulate assets which, in the long term, can then provide a base for moving into different activities that have initial investment requirements leading to higher and/or more stable returns. This classification is useful to consider when conducting livelihood analysis as it recognises the dynamic nature of livelihoods, including people’s aspirations and how people diversify their numerous strategies in pursuit of their livelihood outcomes.

Agriculture, particularly subsistence agriculture, is the primary livelihood strategy for millions of households in developing countries. Globally, over 570 million, 90 per cent, of farms are managed by an individual or a family, relying predominately on family labour. Gollin (2010) estimates that 40.6 per cent of economically active adults are employed in the agricultural sector globally, with this increasing to 54.2 per cent for Africa specifically (Gollin, 2009; cited by Odusola, 2017). While agriculture has long been promoted as a remedy for reducing poverty and hunger, especially in nations where much of the population is engaged in the agricultural sector, there is no consensus as to what that agricultural system would look like for a region or country. In saying this, many actors advocate for the importance of the role of 'smallholder farming', as it is believed to be responsible for a considerable share of the global food production, and accounts for a large share of food consumed in Africa and Asia (Lowder, Skoet and Raney, 2016). Ricciardi *et al.* (2018) found that *“… farms <2 ha produce 28–31 per cent of total crop production and 30–34 per cent of the food supply on 24 per cent of gross agricultural land…”* (Ricciardi *et al.*, 2018, p68).

Despite the crucial role that smallholder agriculture plays in reducing poverty and hunger, the productivity of smallholders in countries like Malawi varies considerably. Smallholders are often the most food insecure because of the array of challenges they face (Wiggins *et al.*, 2016). The livelihood strategies of the rural poor are complex with the production and income determined by seasonal cycles. Common strategies affected by seasonality are crop production, livestock sales and casual labour. In addition to the complex sequencing of these strategies, they are also strongly influenced by weather conditions, crop and livestock pests and diseases, illnesses, volatile and difficult to predict market prices, and by changing policies and political agendas (Dorward, Nava, James Pattison, *et al.*, 2009). Considering all this, smallholder agriculture comes with irregular and unpredictable patterns of production and income. This often does not align with the current needs of household consumption, which is consistent (e.g. daily food needs). There is also the need for households to invest; this could be anything from paying school fees, to purchasing livestock, contracting buildings or stores, or even social events like funerals, weddings or births which depending on the context can be substantial (Dorward *et al.*, 2009, Moser, 1998). The highly seasonal nature of smallholder agriculture results in households struggling to align their different production and income patterns with their consumption and investment needs. This dilemma can restrict smallholders in the ability to progress between 'hanging in' to 'stepping up' and 'stepping out'.

However, as Krishna (2004, p121) wrote: "H*ouseholds in poverty do not usually sit idle waiting for growth (or program benefits) to come their way."* When faced with adverse conditions, people adopt coping strategies (Krishna, 2004, p121). With the emergence of the concept of resilience programming, there has also been a growing recognition of the adept capacity of the poor in managing complex asset portfolio. The ability of households and individuals to avoid or reduce vulnerability is not only reliant on what assets they possess but also their capacity to manage and transform them into income and food (Moser, 1998). Although the term 'coping strategy' has been popularized in the food security literature, it can have a much broader meaning within a livelihood system by distinguishing 'income-raising strategies, which are aimed at acquiring food – and 'consumption modifying strategies' which are aimed at restraining the depletion of food and non-food sources (Devereux, 1993; Moser, 1998).

Unquestionably, these complex characteristics of smallholder farming systems have been written about and considered in policies for decades. What needs more consideration going forward is complexities of the systems and how smallholders are increasingly vulnerable to a spectrum of emerging climatic and market risks (Fan *et al.*, 2013). Although they are adept at implementing coping strategies, the occurrence of any shock compromises an already fragile food production system. The increased frequency of large-scale external shocks like droughts or floods increases the likelihood of smallholders, who may be at the level of 'stepping up', becoming more risk-averse resulting in them choosing to pursue more subsistence-orientated livelihood strategies, rather than risking investment in assets to expand their livelihood activities. This, as a coping strategy, can protect smallholders in the short term when faced with adverse events. However, in the medium to long term, this causes a persistent poverty trap, limiting opportunities to pursue more productive and innovative livelihood strategies (Dercon, 2005; Fan *et al.*, 2013).

Addressing these challenges is critical for rural development as the smallholder sector not only provides employment and incomes, it also ensures the market availability of low-cost, safe and nutritious foods. Therefore this sector is very seen to be key to achieving greater food and nutrition security (Wiggins *et al.*, 2016).

However, for households to realise their livelihood potential, they need to be able to utilise their assets in a way that ensures viable returns that enable households to attain higher levels of wellbeing. This is largely determined by the context in which households operate. The government's provision of socio-economic infrastructure, access to markets, and public services is critical to the smallholder sector as this provides a sound economic environment for households to move from 'hanging in' to 'stepping up' to 'stepping out' (Dorward, Nava, Pattison *et al.*, 2009; Dabalen *et al.*, 2017a).

It should be noted that some smallholders, especially those who are at the 'hanging in' stage, would not be able to transform their livelihood portfolio into a viable model that meets consumption and investment needs throughout the year. These smallholders would likely benefit from targeted social protection that enables them to convert their livelihood strategies into more appropriate non-farm or off-farm income-generating opportunities (Fan *et al.*, 2013).

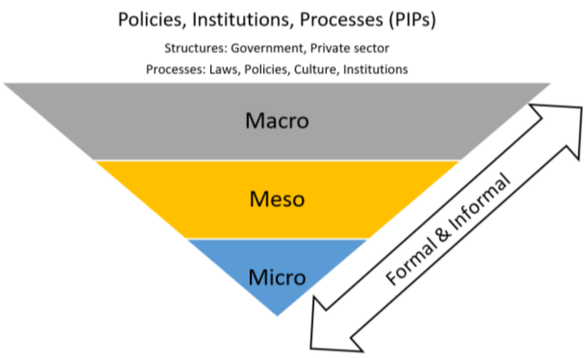
The role of the government, and where relevant, the private sector, in providing supporting policies, institutions, and process (PIPs) for smallholder farmers cannot be underestimated. Within the growing context of increased risks, smallholders need access to risk-management tools and strategies that build their resilience to the vast array of climate and market-related shocks that they are exposed to.

The Role of Policies, Institutions & Processes in Smallholder Agriculture

The term transforming structures and processes in the livelihoods framework is inclusive of policies, institutions and processes (PIPs). (Kébé and Muir, 2008). The PIPs component comprises of the institutions and organisations, policies, legislation and regulations that affect and influence livelihoods (Kébé and Muir, 2008). By analysing the PIPs, a better understanding of how the PIPs enable or hinder access and utilization of livelihood assets and strategies can be gained (Kébé and Muir, 2008).

However, the PIPs component of the livelihoods framework is complex as it covers structures from the micro to the macro level; for example, community groups to national level legislative bodies (Carney, 2003). These PIPs are at all levels and can be formal or informal, as outlined in Figure 2, which is adapted from the Khanya's sustainable livelihoods framework. Added to this complexity is how the issue of rights, power and governance cross-cut PIPs. Carney (2003) outlined how this is a critical factor considering how the status and roles of different groups of people in the allocation, decisions and policy-making process can influence opportunity and choices.

Figure 2: Khanya's Sustainable Livelihoods Basic PIPs Box



Despite the complexity involved with PIPs, inadequate, poorly targeted, institutional capacity and weak macro-micro links are significant constraints to households and communities who are pursuing livelihood improvements (Kébé and Muir, 2008).

Therefore, appropriate PIPs are critical factors influencing the livelihoods of smallholder farmers. In the last twenty years, there have been a plethora of formal PIPs, or interventions, aimed at improving the livelihoods of rural populations in developing countries. The aims of these interventions broadly fall under the guise of poverty reduction and food security.

Conceptual Framework

The previous literature review informed the design of the conceptual framework for this thesis. The overarching aim is to provide substantial insight into how different livelihood components and supports provided, influence key indicators of food security and poverty reduction. A visual depiction of the conceptual framework guiding the study is provided in Figure 3. The conceptual framework is modelled mainly on the sustainable livelihoods framework with specific adaptions to meet the research objectives.

The first research objective is incorporated into two orange boxes. To meet this objective, the thesis presents a detailed description of the main livelihood assets available to households. For the study, using the available data, three categories of livelihood capital assets are explored: human, natural, and economic. Following on from this to the orange box on the right, the livelihood strategies pursued over the study period is examined. The main livelihood strategies examined include paid employment, crop production, and non-agricultural enterprises. These are pursued to achieve agricultural outcomes.

The second research objective is then incorporated in the two green boxes in the bottom right corner of the framework. The first green box looks at the direct agricultural outcomes: production for consumption, production for income, gender equality, food market supply and demand. These can be seen as the four main impact pathways required in order to achieve food security and poverty reduction (World Bank, Hawkes and Ruel, 2007; Arimond *et al.*, 2011; Gillespie and Kadiyala, 2012; Hoddinott, 2012; Ruel and Alderman, 2013; Carletto, Corral and Guelfi, 2016; Aberman, Meerman and Benson, 2018). The second green box focuses explicitly on the ultimate livelihood outcomes - improved food security and an increased asset base. Over time, either within or between seasons and years, the level of food security and asset ownership achieved feeds back into the vulnerability context, livelihood assets, livelihood strategies, and PIPs available to households.

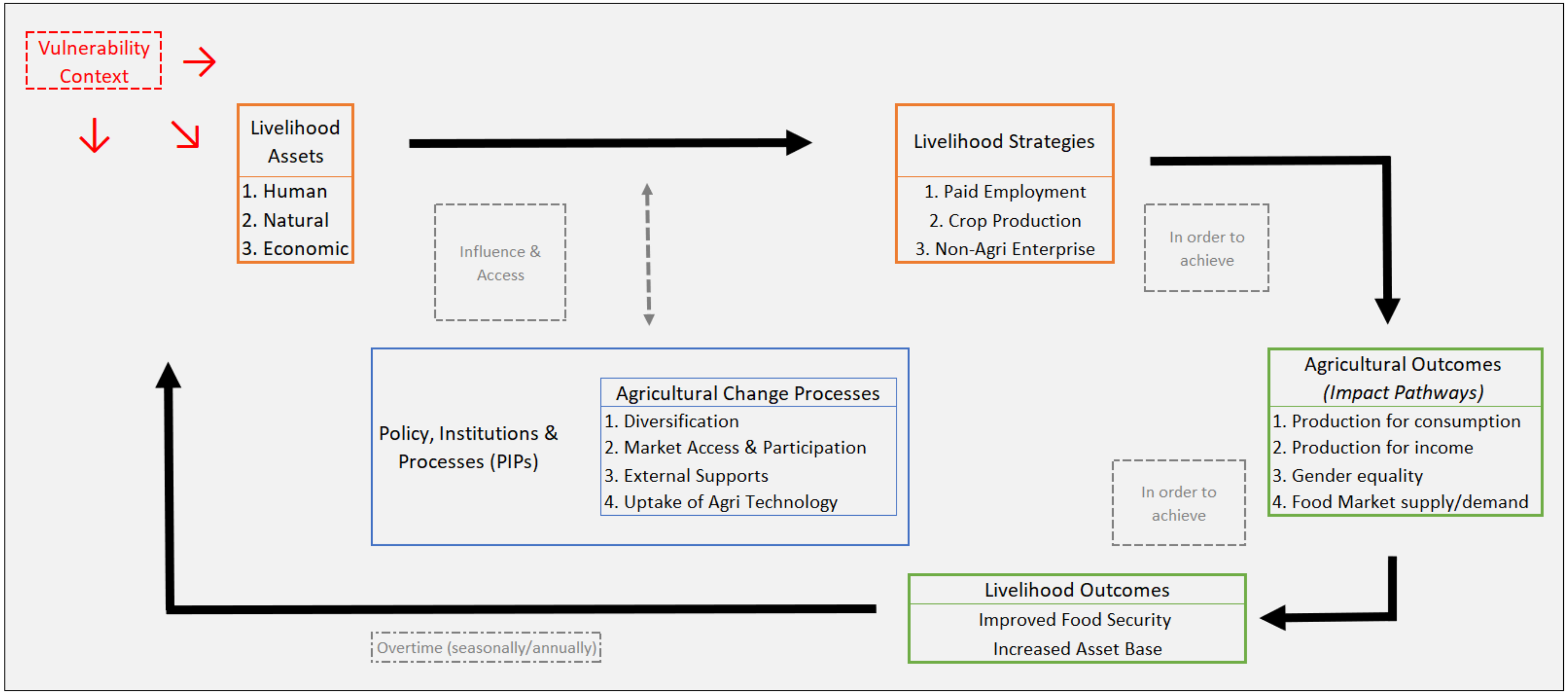
The final research objective is to present the primary agricultural production change processes pursued in the studied area. The change processes fall under the Policy, Processes and Institutions (PIPs) component of the livelihoods framework, classified initially as transforming structures and processes in the literature. By focusing on actual change processes that occur the thesis provides a more holistic understanding of the intricacies of how the PIPs influence households' access to livelihood capital assets and livelihood strategies and ultimately, the livelihood outcomes. Four specific change processes relevant to smallholder farming are studied: diversification, market access and participation, external supports and uptake of agricultural technology. These processes are cross-sectional, and at the micro, meso and macro levels and are widely promoted in poverty reduction and food security policies globally. However, evidence of the efficacy of some of these change processes is limited.

The vulnerability context, which influences all aspects of the livelihood's framework, is explored by looking at the shocks experienced by households and how they were able to respond. The issue of gender equality is examined through disaggregation of all results by gender and analysis of decision-making processes. Asset ownership is used to investigate poverty status differences. This, along with the research objectives outlined above, contributes to a broad understanding of rural smallholder farming household's food security and poverty status.

Summary

This chapter reviewed the evolution of the concept of food security, progress to date and key barriers. Considering that the majority of the world's food insecure are also the world's food producers, especially in countries like Malawi, an understanding of the livelihoods systems of smallholder farmers is crucial to understanding the linkages between livelihood strategies and food security and poverty reduction. A review of the sustainable livelihoods framework was included in this chapter, followed by an analysis of smallholder agriculture as a livelihood strategy. Key issues that emerged were gender, access to and utilisation of livelihood asset, diversity of livelihood strategies, seasonality, and utilisation of produce. Finally, the role of policies, institutes and process were reviewed in the context of smallholder agriculture, looking specifically at what change processes enabled farmers within their livelihood system. Based on the literature review, the conceptual framework for the thesis was developed. This framework guides the analysis in the following chapters.

Figure 3: Conceptual Framework



Chapter 3: Food Security & Malawi's Political Economy

This chapter provides an overview of the food security, poverty and rural economy of Malawi coupled with an exploration of recent trends and challenges. The related national policies and approaches which have evolved since independence are discussed. A chronological review of the agricultural and rural development policies is presented, followed by a detailed analysis of the leading social protection strategy of the past decade, the Farm Input Subsidy Program (FISP). The contents of this chapter provide an understanding of the political economy and the influence this has on the livelihoods and livelihood outcomes of Malawi's rural households.

In the past 20 years, Malawi has seen mostly volatile growth. Dabalen *et al.* (2017b) attribute this to unstable macroeconomic conditions such as high inflation, fiscal deficits and high-interest rates. In comparison to neighbouring Sub-Saharan countries, such as, Ethiopia, Ghana, Rwanda and Uganda, the pace of poverty reduction is slow in Malawi, with the rural poor facing significant food insecurity challenges. Interestingly, there have been notable social improvements. In 2015, Malawi had a literacy rate of 73 per cent for people between 15 and 24 years. Child malnutrition trends are on a downward trajectory - with stunting[3] dropping from 54 per cent in 2004 to 39 per cent in 2015. Similar trends were achieved with the prevalence of children underweight, which dropped from 18 per cent to 12 per cent in the same time frame (Dabalen *et al.*, 2017b; National Statistical Office, 2017a). These figures were reported in the nationally representative Demographic and Health Survey (DHS), however, the Second and Third Malawi Integrated Household Surveys report more substantial declines (National Statistical Office, 2004, 2012, 2017a, 2017b).

The positive progress made in Malawi's health, nutrition and education sectors has meant that they have partially or fully achieved half of their 2015 MDG targets. Specifically MDG target 1c for reducing undernutrition, MDG 2a for achieving

[3] "Stunting, or low height for age, is caused by long-term insufficient nutrient intake and frequent infections. Stunting generally occurs before age two, and effects are largely irreversible. These include delayed motor development, impaired cognitive function and poor school performance."(UNICEF, 2007)

universal primary education, MDG 4 for reducing child mortality, and MDG 6 for combating HIV/AIDS, malaria and other diseases (Dabalen *et al.*, 2017b). These are very encouraging improvements in the more non-economic dimensions of poverty and wellbeing.

Unfortunately, challenges around the social-economic dimensions of poverty have persisted, especially in rural Malawi. The IHS3 result showed that 50.7 per cent of the population feed into the moderately poor category, with 24.5 per cent falling into the ultra-poor category, both poverty rates being higher in rural areas (National Statistical Office, 2012). As noted in Chapter 1, Dabalen *et al.* (2017) cite three reasons to be cautious around the IHS poverty headcount results. There is substantial uncertainty around headcount estimates because the recall period of the IHS questionnaire did not capture the lean season when consumption typically drops and poverty increases. In addition to this, any gains captured in 2010-11 are likely to have been reversed by the large-scale floods in 2015, and also the droughts and floods in 2016. In 2017, 73 per cent of the population in Malawi did not have enough food in the 12 months before the IHS4 questionnaire (National Statistical Office, 2017b).

In Malawi, rural households are incredibly vulnerable to external shocks, which are significant drivers of food insecurity and chronic poverty. The fourth IHS report in 2017 showed that almost all rural households surveyed reported experiencing at least one shock, an increase from 70 per cent of households in the third IHS in 2011 (National Statistical Office, 2012, 2017b). In 2017, the top three shocks experienced by rural households were: unusually high prices for food affecting 66.9 per cent of households, intermittent rains affecting 66.5 per cent of households, and unusually high costs of agricultural inputs, which affected 52.7 per cent of households. These top three shocks were the same, but at lower prevalence rates, in the third IHS in 2011: drought/irregular rainfall affecting 43.1 per cent of households, unusually high costs of agricultural inputs, affecting 29.5 per cent of households, and unusually high prices for food affecting 25.7 per cent of households.

The primary source of income for rural households in Malawi is rain-fed crop production, which also acts as the primary source of food. As a livelihood strategy, rain-fed crop production in Malawi is considered risky due to volatile market prices and weather shocks (Chirwa and Chinsinga, 2013). Casual agricultural labour is another important source of income for a rural household. This work is referred to as 'ganyu' labour in Malawi, typically short-term arrangements on neighbouring farms, large-scale farms and plantations. The extremely poor and landless are mainly dependent on this type of arrangement, which is highly seasonal. Many rural households diversify into non-farm activities for livelihood strategies. Popular ventures include small scale enterprises like buying and selling vegetables, cooked foods, and small repairs for tools and equipment. Other non-farm sources of income can include waged employment in other locations.

Given the limited number and highly seasonal wage-earning opportunities available, rural Malawians are overly dependent on the rain-fed agricultural system. Rain-fed crop production leaves rural households especially vulnerable to erratic weather patterns, food production trends and food prices. Chirwa and Chinsinga (2013) referred to the problem of price volatility as *food price swings*. This can be a significant problem between December and March - the lean season when food prices increase sharply, and households run out of food from their own production. Most producers are smallholder farmers cultivating small plots of approximately 1 hectare, with maize being the predominant crop produced, and legumes and pulses supplementing. Tobacco was in the past, an important cash crop. Its dominance, however, has declined in recent years due to global pressure to reduce production and weak prices at the auction floors. Interestingly, although small in scale, the contribution of smallholder farmers to the economy is substantial. It is estimated that they contribute more than 70 per cent of agricultural GDP (Dabalen *et al.*, 2017b).

Many authors argue that improving agricultural productivity is necessary to improve rural poverty and food insecurity rates (Dabalen *et al.*, 2017b). This is a plausible recommendation considering that the agricultural sector employs 84.7 per cent of the population, but only contributes to 26.1 per cent of the annual GDP (World Bank, 2019). Using the third IHS dataset, it is estimated by the World Bank that a 50 per cent increase in maize yield would reduce the poverty rate among rural households by about seven percentage points, and lift over 600,000 individuals out of poverty (World Bank, 2016; cited by Dabalen *et al.*, 2017). Recent estimates show that maize yields of 1.4 tons per hectare are considerably low, given the agronomic potential of 4.5 tons per hectare, under the right climatic conditions and input application (Benson and Edelman, 2016; cited by Dabalen *et al.*, 2017). Despite the production of maize being heavily subsided, the growth needed to impact on the trajectory of rural poverty was not being achieved. Between 2010 and 2013, maize yields only grew by 8 per cent (Dabalen *et al.*, 2017b). This growth was primarily dominated by the more well-off farmers, with poorer farmers having 31 per cent lower yields in comparison (Dabalen *et al.*, 2017b). Thus, not only is there persistent low productivity, the poorest are not feeling the impact of the small gains that are being made.

To address the problem of stagnant rural poverty and food insecurity trends, the political economy needs to address the following issues: low productivity, limited opportunity and low returns from non-farm employment, and low impact of safety net programs due to macroeconomic and political instability.

Malawi's Recent Agricultural Policy

There is a plethora of policy documents, strategies and action plans that target rural development, agriculture and smallholders. These include The National Export Strategy (2013-2018), the Agricultural Extension Policy (2000), the Social Protection Policy (2008), the National Nutrition Policy and Strategic Plan (2018), the National Gender Policy (2015), the National Youth Policy (2013), the National Land Use Planning and Management Policy (2005) the National Climate Change Policy (2012), and the National Resilience Policy Strategy and Policy (2018-2030), amongst others.

However, The National Agricultural Policy (NAP) is likely to have the most direct impact on the development of the smallholder farming sector. The current policy aims to provide clear and comprehensive agricultural policy guidance from 2016 to 2020. Its specific objective is to guide Malawi in the transformation of the agricultural sector, particularly around increased production, productivity and real farm incomes (Ministry of Agriculture Irrigation and Water Development, 2016). This policy is aligned to Malawi's overarching national development plan, Vision 2020, and the Malawi Growth and Development Strategy (MGDS III), the long- and medium-term development strategies, respectively. Currently the implementation of the NAP is being guided by the National Agricultural Investment Plan (NAIP) (2018-2023) (Ministry of Agriculture, 2018).

The comprehensive National Agricultural Policy document outlines how, by 2020, through the specialisation of smallholder farm production, output diversification, and value addition - the agricultural sector is characterised by more profitable commercial farming. There are eight ambitious policy priority areas: 1) Sustainable Agricultural Production and Productivity, 2) Sustainable Irrigation Development, 3) Mechanisation of Agriculture, 4) Agricultural Market Development, Agro Processing and Value Addition, 5) Food and Nutrition Security, 6) Agricultural Risk Management, 7) Empowerment of Youth, Women and Vulnerable Groups in Agriculture, 8) Institutional Development, Coordination and Capacity Strengthening. The Agricultural Sector Wide Approach project (ASWAp) supports the realisation of these policy priories and other agricultural-related policies. This works to coordinate all agricultural related interventions by identifying critical constraints in the agricultural sector and required investments, and to facilitate a formalised stakeholder coordination process and budgetary framework (Ministry of Agriculture and Food Security, 2011).

The National Agricultural policy is the cornerstone policy for agricultural and rural development. By design, it is in line and has established links to other sub-sectoral and cross-sectoral policies and strategic documents listed earlier. The policy document has acknowledged that regretfully there has been a lack of coherence both within the agricultural sector and between other sectors. Despite this, Malawi has consistently allocated more than 10 per cent of its annual national budget to agriculture, which is required by the Comprehensive Africa Agricultural Development Programme

(CAADP)[4]. An analysis of the public expenditure in support of food and agriculture between 2006-2013 was carried out by the FAO. The findings reported that the actual expenditure in support of food and agriculture averaged at around 17 per cent between 2006 and 2013 (FAO, 2015a). However, the primary focus of this spending was the Farm Input Subsidy Programme (FISP). On average between 2006 and 2013, the government allocated 57 per cent of public expenditure budget in support of food and agriculture on the FISP; this represented 9.8 per cent of overall national spending (Dorward and Chirwa, 2011; FAO, 2015a). A review of the NAIP (2018-2023) substantiates this concentration of the government's agricultural spending. The NAIP budget allocations are made across four broad intervention areas: (1) policies, institutions, and coordination (2) resilient livelihoods and agri-systems, (3) production and productivity (d) markets, value addition, trade and finance. However, most of the finances go towards roads, irrigation infrastructure and activities related to FISP. Provisions for extension supports and community level supports appear to be scant with relatively low levels of coverage (Ministry of Agriculture, 2018).

Despite national statistics showing an increase in productivity and reduction in undernourishment, the debate around the efficiency and effectiveness of the FISP goes on at the national and international level. This debate is compounded by the fact that every year there is some subset of Malawi's population in need of emergency food assistance. The government of Malawi estimated 2.8 million people required assistance (16 per cent of the total population) in the 2015-16 lean season. In the 2016-17 season this increased exponentially to 6.5 million people (37 per cent of the total population) (Aberman, 2019). These recurrent food shortages are, in many ways, a consequence of unfavourable weather patterns that result in crop production failure; but the cause of these food shortages runs deeper. Ellis and Manada (2012) explore this in their paper, by looking at how seasonal price changes for maize is a key

[4] CAADP stipulates that countries should allocate at least 10 percent of their annual national budgets to the agriculture sector, in order to foster agricultural GDP growth of more than 6 percent per annum (Ministry of Agriculture Irrigation and Water Development, 2016).

driver in the vulnerability to food deficits for smallholders in Malawi and what the policy responses have been to alleviate or exacerbate this.

Key Events Since 2010

The design of the original research study took place in 2010, with the final data collection taking place in 2013. The write-up and submission of this thesis took place in 2020. Since the initial study design, there have been numerous events that have had a direct impact on Malawi's political economy, which need to be acknowledged.

The country has suffered repeated drought and flooding in recent years: flooding and dry spells in 2014-15, drought caused by the strongest El Niño for 35 years in 2015-16, Fall Army Worm infestations in 2016-17, a prolonged dry spell in the 2017-18 summer cropping season and devastating floods and damage from Cyclone Idai in 2019. Cyclone Idai impacted more than 922,900 people and displaced 82,700 people, according to the Government. 91,638 hectares of various crops (maize, pulse, rice, sorghum, millet) worth $19.3 million were destroyed in 15 districts. The damage resulted from the floods submerging fields, subsequently ruining crops. Livestock was equally damaged, negatively affecting 11,194 households (FEWSNET, 2020).

Along with these significant natural disasters, Malawi saw considerable levels of political instability in the last decade. In 2012, after the sudden death of Bingu wa Mutharika, Vice President Joyce Banda took power, becoming the country's first female president. Upon the death of President Mutharika, the government failed to notify the people of his death promptly leading to a constitutional crisis. This was on top of the long-running nationwide fuel shortage and a hard currency shortage caused by the freezing of aid by the international community (Haug and Westengen, 2020; Prowse and Grassin, 2020). President Banda's government was quick to restore ties with international donors resulting in the unfreezing of foreign aid. Also, her government took the advice of the IMF and devalued the Malawian Kwacha against the US dollar by 34 per cent to curb the unprecedented inflation. However, a year and a half into her presidency, Banda and her administration faced serious corruption allegations in October 2014. International aid was again frozen and inflation continued. Political discourse during Banda's term was largely dominated with issues around the legacy of the previous president and current corruption. In mid-2014, she suffered a substantial defeat in the presidential election to Peter Mutharika, brother of the late Bingu wa Mutharika (Nkhoma, Bosman and Eduful, 2019; Haug and Westengen, 2020; Prowse and Grassin, 2020).

Like President Banda, President Peter Mutharika's first term was plagued with similar issues around corruption, food insecurity, inflation, and power cuts. However, with this came growing civic unrest and frustration. Elections were held again in mid-2019 and Mutharika was announced as the winner of the election. However, the entire process was marred with controversy and irregularities. Subsequently, a high court ruling in February 2020 nullified the 2019 results and ordered for fresh elections to be held in June 2020. President Mutharika lost this election to the opposing party Malawi Congress Party (MCP) leader Lazarus Chakwera (Haug and Westengen, 2020; Prowse and Grassin, 2020; Rapanyane and Tirivangasi, 2020).

The last decade is just one snapshot of the continuous political flux that Malawi has been in since independence. This is one of the fundamental barriers to achieving sustained levels of reduction in poverty or food insecurity. This environment of instability has created a void where there should be long-term political thinking and investment, instead there is rent-seeking behaviour, fuelled by regionalism, socioeconomic inequality and elitism (Benson *et al.*, 2019). As Banik and Chasukwa) (2019) suggested for Malawi *"Strong and committed political leadership is required to harness all forces for the effective coordination and implementation of food security policy and the achievement of SDG2*" (Banik and Chasukwa, 2019, p204). However, the lack of the much-needed policy coherence has been a long running issue in Malawi's agricultural sector, likely dating back to post-independence, this has in turn exacerbated food insecurity.

The Evolution of Malawi's Political System

Malawi gained independence in 1964; but it was not until 1994 that the current multi-party democracy was established. Before this, there were three decades of autocratic rule under the leadership of Dr Hastings Kamuzu Banda and the Malawi Congress Party (MCP) (Chirwa and Chinsinga, 2013; Chirwa and Dorward, 2013).

Chirwa and Dorward (2013) categorised the period under Kamuzu Banda's rule into two phases. The first phase saw rapid economic growth, brought about by policies that focused on the development of a highly import-dependent agricultural estate sector, with tobacco being the primary crop. During this time, growth of the smallholder sector was stifled by restrictive policies, chiefly the ban on smallholder tobacco cultivation. Farmers had no alternative but to produce food and low-value cash crops and act as a cheap labour force for the estate sector (Chirwa and Dorward, 2013). Meanwhile, Banda and the political elite used the promotion of tobacco as a way of expanding their political patronage through investing in secondary and higher education in the central and northern regions, expanding civil service employment, and ensuring the support of the masses by launching large scale visible infrastructure projects across the country (Chirwa and Dorward, 2013). What was neglected, if not played down, was persistent, widespread chronic poverty and the lack of welfare policies that explicitly targeted this.

With the 1980s came several external economic shocks and Kamuzu Banda's government had to seek financial assistance from the IMF and the World Bank. This assistance came with significant policy conditions that brought about the second phase of Kamuzu Banda's rule. The policy conditions being prescribed to Malawi by the World Bank and IMF were fitting of that time – liberalisation. There were radical reforms around the smallholder sector, tobacco production restriction was lifted, and soon, tobacco substituted maize production (Chirwa and Dorward, 2013). Small-scale tobacco estates emerged in the central and northern regions. The removal of fertiliser subsidies and other market reforms caused unsuccessful results. This all cumulated in a food crisis in 1987, primarily due to rapid increases in maize prices (Chirwa and Dorward, 2013). Under severe political pressure, Banda's government was forced to reverse many of these policy changes with the reintroduction of fertiliser subsidies and intervention in the maize markets. This still failed to resolve the food shortages, after there were two severe droughts between 1992 and 1994 (Chirwa and Dorward, 2013).

Unfortunately, the impact that the post-independence period has had on Malawi's political system up until this day is deeply ingrained. When Malawi was a one-party state, the ruling party was said to have *"…systematically, and strategically curtailed fundamental freedoms and human rights cultivated a political culture of fear, docility, suspicion and total loyalty and obedience to authority"* (Chirwa and Chinsinga, 2013, p5). Post-independence policy and the related processes mentioned earlier were a product of the centralised nature of power in the one-party system. The president dominated the policy-making process, which was technocratic and could not be critiqued by the public (Chirwa and Chinsinga, 2013).

The transition to multi-party democracy in 1994 was expected to bring about fundamental change to the political system in Malawi. The constitution was changed in a way that would disperse power to public institutions, private institutions and citizens, and it stated that; legitimacy to govern derives directly from the people of Malawi and those privileged to govern continue to do so upon the sustained trust of the people (Chirwa and Chinsinga, 2013). Despite this, the president remained a dominant force in the political system, something that is seen as a direct consequence of the legacy of the one-party era. This caveat to the supposedly democratic systems is held up by how incumbent presidents are linked to expansive patronage networks and have the ultimate power to appoint whomever they see fit for a wide range of senior positions (Chirwa and Chinsinga, 2013). Added to this the political system in Malawi is intensely regional, parties are split between the three regions: north, centre and south. It is worth noting that since the transition to democracy in 1994, all four sitting presidents have come from the southern region of Malawi, which is the most densely populated region.

The strength of the centralised system, dominated by the president, is reinforced by the lack of a robust civil society and private sector. Given that the state provides the most lucrative contracts in Malawi, most large scale private sector companies are likely to be unviable without state business (Chirwa and Chinsinga, 2013). Therefore, the state and the private sector are more likely to protect each other's interest. Regarding civil society, the culture of centralised power, patronage, and financial mismanagement has been replicated from the political system. This has rendered many civil society institutions ineffective and misdirected.

Chirwa and Chinsinga (2013) cited Cammack (2010) when summarising their critique of the Malawian political economy. The characteristics they quoted included *"…prevalence of patronage, clientelism, opportunism and corruption, centralising authoritarian tendency of the executive, relative weakness of the citizenry and civil society vis-à-vis the state, deference to hierarchy, and gender discrimination"* (Chirwa and Chinsinga, 2013, p6). This culture then creates an environment where the policy-making process is dominated by rent-seeking tendencies.

It was not until 1998 when 'fertiliser politics' began in Malawi. This was amid economic stagnation, growing population pressure on the land - especially in the south, where there was declining soil fertility, and the highly politized issue of maize self-sufficiency (Chirwa and Dorward, 2013). The Muluzi government of the time introduced universal free provisioning of starter packs; these contained maize seeds and fertiliser (Chirwa and Dorward, 2013). Since then numerous iterations of fertiliser provision or subsidies have been rolled out, right up to this day in Malawi. The design and budget allocation to the various iterations of the programme have always proven to be contentious, especially during presidential elections (Chirwa and Dorward, 2013).

Although agricultural inputs like fertiliser and seed are important in an agricultural economy like Malawi's, the amount of discussion and policy dialogue around fertiliser and maize is unparalleled with other issues. Since independence, the political interest in agriculture has been driven by regional or patronage group interests, which have been focused on food (namely maize), fertiliser and tobacco. Chirwa and Dorward (2013) make an important note that it is entirely appropriate that the political discourse is preoccupied with the issue of food security, regardless of populism or patronage, given that it is a major preoccupation for poor people. Whether they are from rural or urban areas, the poor spend a large proportion of their income on staple foods like maize and are extremely vulnerable to price changes.

Malawi’s Maize Price Trends and the Role of the Government

The cause and impact of volatile staple food price trends are written about extensively in the literature (Orr and Saiti-Chitsonga, 2009; Manda, 2010; Ellis and Manda, 2012; Cornia, Deotti and Sassi, 2016; Edelman, 2016; Davis, Di Giuseppe and Zezza, 2017; Gilbert, Christiaensen and Kaminski, 2017; Sabates-Wheeler, Sabates and Devereux, 2018; Aberman, 2019). In Malawi and most other countries in the region, levels of food insecurity and food availability are seasonal in nature. Manda (2010) estimated that the gross seasonal margin for maize in Malawi averaged 60 per cent between 1989 and 2009. In this period, there were extreme price volatility episodes when lean season prices were anywhere between 2 to 300 per cent above post-harvest prices. It is estimated that these extreme price volatility episodes occurred roughly every three years (Manda, 2010).

Recurrent instances of extreme price volatility are well recognised as a problem for agricultural efficiency and growth. When there are extreme price spikes, there is uncertainty, especially around what investment decisions farmers should make at planting time. Often farmers make their decisions based on prices received for their last harvest, which would have been at least six months previously. This experience is said to make farmers more risk-averse and to be reinforcing a subsistence orientation (Manda, 2010: Gilbert, Christiaensen and Kaminski, 2017). A food deficit is also created in the lean season, resulting in farming households experiencing an ‘exchange entitlement failure’ - selling their produce at the lowest price point just after harvest, but then buying back later at the highest price point - which leads to hunger, adverse coping behaviours and in severe cases large scale food crises, like those experienced in 2000-02, 2004-06, 2007-09, 2012-13, and 2015-16 (Manda, 2010; Ellis and Manda, 2012; Sassi, 2015).

It should be noted that when a staple crop production is cyclical, some seasonality in prices is reasonable. However, there are other issues that are fuelling the seasonal price gap in Malawi, for instance; poorly integrated markets, reactive trade restrictions, limited storage capacity at farm level and lack of credit facilities, all of which contribute to the occurrence of exchange entitlement failure (Gilbert, Christiaensen and Kaminski, 2017).

The fact that the extreme seasonality of maize prices is attributable to the political or institutional factors, as much, if not more than agro-economic factors, makes smallholder farmers extremely vulnerable to something that is beyond their control (Ellis and Manda, 2012; Gilbert, Christiaensen and Kaminski, 2017). In response to predicted food shortages and price spikes, the government typically implements export bans and sets minimum farm gate prices.

Understandably, there is a lot of criticism of these moves, along with the aggressive procurement of maize by state parastatals. Analysis suggests that most of these government reactions exacerbate seasonal price instability, prohibit private sector trade, especially cross border trade which can have a positive impact on supply and prices (Ellis and Manda, 2012; Edelman, 2016).

The government's use of production estimates rather than market prices as indicators of future maize availability is thought to be a key contributor to the ineffective trade restrictions they have repeatedly put in place (Ellis and Manda, 2012; Edelman, 2016). The main objective of an export ban is to stop the flow of a commodity out of a country. In Malawi, the maize export bans aim to lower, if not stabilize the domestic maize price relative to international prices (Edelman, 2016). Added to this there is, as Ellis and Manda (2012) call it, the 'question of credible commitment', which Edelman (2016) also eludes to by speculating that the government may be more inclined to enforce export bans as a misplaced attempt to protect the considerable investments they make in the FISP, be it in national or in self-interest. Ellis and Manda (2010) go as far as to say that the 2007-09 price spikes were overtly political. The government placed export bans, enforced minimum maize prices, and ultimately placed an outright ban on private maize trade. It is thought the main motivation behind these measures was to protect the political reputation at home and abroad that the then President Bingu wa Mutharika had gained from the successive record harvest in 2006 and 2007, that was then attributed to the implementation of the FISP. Added to this was an upcoming election in 2009.

Even when political motivations are put aside, the economic rationale behind the decision making process to enforce export bans appears to be flawed, when the trends are examined. An export ban is said to be in the interest of a country when the domestic price for a product like maize, falls below the export parity price that traders would then be able to seek out in international markets. However, Eldeman's analysis of maize price trends between 2004 and 2014, shows that during the more than six years of maize export bans, the domestic price for maize only fell below the regional export parity price seven times, that is seven months out of a possible 73 months. This shows that the export bans were likely unnecessary as there was a minimal incentive for traders to export maize in the first place, as the prices they could receive within Malawi were more lucrative (Edelman, 2016).

In addition to this, the maize export bans mentioned above did not seem to bring down the price of maize on the local market. Further analysis by Edelman (2012) shows that of twelve markets that were examined, four showed lower price volatility during export bans. However, eight of the twelve markets exhibited increased volatility compared to when there are no export bans in place. This builds on other studies, including a cross country analysis of 12 countries in Eastern and Southern Africa, which finds that export bans do not influence lowering domestic prices in comparison to neighbouring markets.

Another action that the government of Malawi takes to stabilise prices and protect buyers is by setting minimum farm gate prices. Their justification for this is that the minimum price will protect farmers from traders who are likely to take advantage of farmers at a critical time of year when there is a high demand for cash immediately after the harvest. However, between 2006 and 2011, it was found that the minimum farm gate prices were higher than the import parity for maize. Simply put, farmers, who were backed by their government, were able to demand a price that was higher than what it would cost a trader to import. This then resulted in Malawian farmers being at a disadvantage in comparison to other maize producers in the region and stifling cross border trade (Edelman, 2016).

The Role of the FISP in Malawi's Agricultural Sector

As already mentioned earlier, there is a long-running debate around Malawi's Farm Input Subsidy Programme (FISP), both at the national and international level. This section provides a review of the literature around this debate and seeks to understand the extent of the impact of the recent FISP iterations and to gauge if the full potential is being reached. It also asks how adjustments to the design and implementation of the FISP may bring about more transformational change.

Countries in Sub-Saharan African (SSA) that have in recent years implemented input subsidies for chemical inorganic fertilisers and improved seeds, including Malawi, Kenya, Zambia, Nigeria, Tanzania, Senegal, Ghana, and Ethiopia. Although such subsidy programs have brought much contention both internally within the national governments and externally with their international development partners, these subsidies are not something new to the 21st century. For many of the countries listed, the recent subsidy programmes are replacements for programmes that were phased out in the late 1980s and early 1990s as part of the structural adjustment programs (Lunduka, Ricker-Gilbert and Fisher, 2013).

In comparison to other countries in SSA, Malawi's FISP is the most substantial input subsidy relative to GDP and has an ambitious target to reach more than 50 per cent of agricultural households (Dabalen *et al.*, 2017b). FISP does not come without criticism despite being credited with being an effective program in bringing about an African Green Revolution (Ragasa and Mazunda, 2018). The high, and unsustainable costs, unreliable production and trade data, inconsistent farm-level impact and development outcomes are the main issues for debate found in the literature (Ricker-Gilbert, 2011; Chibwana, Fisher and Shively, 2012; Chirwa and Dorward, 2013; Lunduka, Ricker-Gilbert and Fisher, 2013; Katengeza, Holden and Lunduka, 2018; Ragasa and Mazunda, 2018).

Design and Evolution

All agricultural policies and programmes in Malawi have been heavily centred on maize. FISP exemplifies this almost entirely. Phrases like 'maize is life', 'maize is food', and ‘maize is politics’ are commonly quoted amongst policy stakeholder, farmers and within the literature (Chinsinga, Mangani and Mvula, 2011; Aberman, Meerman and Benson, 2018; Ragasa *et al.*, 2019). There were numerous variations to the subsidy programmes dating back to 1998, where ‘starter packs’ were provided (Baulch Todd Benson and Erman, 2019). These original programmes were implemented at varying levels of scale and targeting criteria, and yet households continued to suffer from severe levels of food insecurity, with the 2004 – 2005 season being particularly bad (Ellis and Manda, 2012; Pace *et al.*, 2017). Consequently, the current iteration of input subsidies originated in 2004, with President Bingu wa Mutharika who promised a return to subsidies during his election campaign.

The selling point of the first programme was to enable people to grow and eat their food – ‘food’ being maize (Ragasa *et al.*, 2019). Redeemable vouchers for subsidised improved maize seed, maize fertiliser, and tobacco fertiliser were distributed to approximately 50 per cent of farming households (Asfaw *et al.*, 2017; Pace *et al.*, 2017). The government financed this with international donor support (Dorward, Chirwa and Jayne, 2011).

At the time, the subsidy program was dubbed as a major success both at home and internationally, winning President Mutharika a lot of favour (Dorward, Chirwa and Jayne, 2011; Aberman, 2019). Maize production levels were said to have reached surplus levels as a result of the subsidies. On the contrary, more recent estimates argued that the effect was overestimated, possibly inflated, targeting was inefficient, and household level benefits were limited to the current production season (Ricker-Gilbert, 2011; Lunduka, Ricker-Gilbert and Fisher, 2013; Pauw and Thurlow, 2014; Katengeza, Holden and Lunduka, 2018; Aberman, 2019).

Since 2005, the programme has evolved considerably in its design and implementation. The most recent iterations target smallholder farmers who are resource-poor but own land, and the most vulnerable groups, such as child-headed households, female-headed households, orphan-headed households and households affected by HIV/AIDS. At the community level, since the targeting criteria are quite broad, the number of eligible households tends to be much higher than the number of coupons allocated (Pace *et al.*, 2017).

In 2015, reforms were implemented by the government; these included allowing direct private sector involvement and reducing the subsidy level of the fertiliser from 95 per cent to 80 per cent. They also decided to select 1.5 million beneficiaries at random, with the promise that the list of names would be alternated on an annual basis, in an attempt to ensure that all farmers would receive subsidies once in every three years (Pace *et al.*, 2017). Despite reforms, critics see FISP as increasingly costly and inefficient, especially without accompanying improvements in agricultural development and poverty reduction (Dabalen *et al.*, 2017b).

Operational Inefficiencies

Increased costs due to inefficient management of FISP have led to a high fiscal burden with high budget overruns. Each year there are budget overruns. For example, in both the 2014/2015 and 2015/2016 iterations, there was an estimated 45.8 billion (MWK) overrun. This was on average 30 per cent above the original budgeted cost. Dadalen et al., make an important observation; these overrun figures do not include interest charged on delayed payments. This interest is said to account for a sizable proportion of Malawi’s budget deficit for the same period (Dabalen *et al.*, 2017b).

There are several critical inefficiencies related to the FISP that are reported frequently in the literature.

One of the chief inefficiencies is the targeting of beneficiaries. Despite the targeting criteria being well-defined, often these are disregarded at the local level. This has confused allocation procedures and caused widespread ambiguity around the actual impact of the programme. Numerous studies have claimed that the FISP has concentrated on the rural middle income or higher-income households at the expense of poor productive farmers (Ricker-Gilbert, 2011; Asfaw *et al.*, 2017). The decentralised, community-based targeting system employed in the FISP ensures that local knowledge is used, and costs are kept low. Regretfully, such targeting strategies are known to suffer from elite capture resulting in those with social connections and resources, gaining a disproportionate share of coupons (Dabalen *et al.*, 2017b). A study by Kilic, Whitney and Winters (2015) found that, on average, households that were seen as better off, connected to community leadership, and residing in a desirable agro ecological location were more likely to be a FISP beneficiary. Added to this, in another study, using the 2013 Integrated Household Survey (IHS) dataset, Dabalen *et al.* (2017) estimated that one-third of households in the bottom wealth quintile were FISP beneficiaries, in comparison to half of the households in the top two wealth quintiles.

There are numerous studies and evaluations around the FISP, the majority of which cite targeting as an issue leading to the conclusion that over the duration of the program Malawi's rural poor have not been specifically targeted and thus are not receiving the full benefit (Chibwana, Fisher and Shively, 2012; Chinsinga, 2012; Chirwa and Dorward, 2013; Dorward and Chirwa, 2013; Lunduka, Ricker-Gilbert and Fisher, 2013; Dabalen *et al.*, 2017b; Katengeza, Holden and Lunduka, 2018). A plausible significant contributor to targeting anomalies is the unreliable national list of farming households used for targeting. This list is said to have been inflated from 2.5 million farming households, as per the 2008 population census, to 3.8 million households. The non-existent surplus households are listed as having received coupons; these unclaimed coupons are then introduced to the market by government officials and traditional leaders (Dorward and Chirwa, 2011; Holden and Lunduka, 2013; Lunduka, Ricker-Gilbert and Fisher, 2013).

This leads to the problem of diversion and leakage. Lunduka, Ricker-Gilbert and Fisher (2013) define diversion as coupons for subsidised fertiliser taken by government officials and resold as purely commercial fertiliser. They refer to leakage as coupons and subsidised fertiliser that are resold by recipient households on the secondary market. The same study refers to findings from Holden and Lunduka (2013) who established, from a survey of 450 farm households, that these households purchased on average 0.23 bags of subsidised fertiliser and approximately 20 per cent of this came from 'illegal' sources. It was feasible that these households either bought their fertiliser from someone else and redeemed the coupons at official distributors, or else bought cheap 'commercial fertiliser' that was more than likely diverted subsidised fertiliser sold by vendors. In some instances, diversion and leakage could have a positive impact, if those who receive the fertiliser are in a better position to use the inputs more efficiently than farmers initially targeted. However, findings show that this is more often not the case as better-off farmers are more likely to acquire leaked and diverted inputs despite being able to afford commercial fertiliser. This then has a negative knock-on effect on the commercial market by reducing the demand for un-subsided, commercial fertilisers (Lunduka, Ricker-Gilbert and Fisher, 2013).

Another inefficiency discovered was the high level of politicisation. Lunduka, Ricker-Gilbert and Fisher (2013) cite two studies again where empirical evidence of politicisation was found. The first reveals that households, in districts where the ruling party won the last presidential election, received on average, 1.66 kg more subsidised seed and 13.16 kg more subsidised fertiliser in comparison to other districts (Mason and Ricker-Gilbert, 2013; cited by Lunduka, Ricker-Gilbert and Fisher, 2013). The second study cited, revealed that households, where the ruling party had a large number of supporters, had a higher probability of receiving fertiliser coupons in contrast to districts with fewer supports (Holden and Lunduka, 2013; cited by Lunduka, Ricker-Gilbert and Fisher, 2013).

One of the less written about inefficiencies, but undoubtedly a key cost driver is logistics. Earlier iterations of the FISP were plagued with logistical challenges; this was caused mainly by delays in the distribution of coupons and tendering process for distributors. To illustrate this, in the 2008/09 season, by the end of December, only 68 per cent of the fertiliser sales were completed, with the remainder of sales to be completed in January. This was much too late as planting begins in October. By January, the crop would have already matured beyond the point where it would have been appropriate to apply fertiliser (Dorward, Chirwa and Jayne, 2011; Lunduka, Ricker-Gilbert and Fisher, 2013). Although there have been improvements since the 2008/2009 season there remains considerable inefficiencies in terms of logistics. The allocation of small quantities of inputs for distribution to numerous contractors is one example that should be highlighted. This results in the average purchase cost being driven up, an inefficient fertiliser delivery mechanism and ineffective supportive infrastructure (Dabalen *et al.*, 2017b).

These are just some of the numerous empirical and anecdotal examples of diversion, leakage, corruption and politicisation of the FISP identified in the literature, and indeed found during fieldwork for this study. These findings are significant, given the far-reaching impact they have on the effectiveness of the FISP in meeting its objectives.

Complimentary Supports to Farmers

As stated earlier in this section, between the 2005/2006 and 2008/2009 seasons Malawi spent on average 9.8 per cent of its national budget, subsidising fertiliser and seed. In terms of the agricultural budget, the FISP is estimated to have accounted for 48.90 per cent in 2011/2012 season, decreasing from the 60.1 per cent in 2010/2011 and 52.7 per cent in 2009/2010 (Table 1) (Chirwa and Dorward, 2013). In comparison to this, only 7 per cent of the agricultural budget that was allocated to technology generation and dissemination between 2007 and 2012 (Ragasa and Mazunda, 2018). Extension services fared even worse, making up only 1.6 per cent of agricultural spending in 2012/2013 (Ragasa and Mazunda, 2018).

Table 1: Percentage of Agricultural and National Budget Allocated to FISP costs[5]

	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12
% of Agricultural Budget	46.80%	57.20%	67.60%	52.70%	60.10%	48.90%
% of National Budget	6.80%	8.20%	16.20%	6.50%	8.00%	7.10%

The disproportional allocation of funding to the FISP leads to an imbalance in Malawi's agricultural budget, leaving minimal funding for other services and roles in the sector (Ragasa and Mazunda, 2018). Although there is said to be an increasing emphasis on the provision of pluralistic extension services in Malawi, this has yet to be seen in the public expenditure allocations (Dorward, 2014; FAO, 2015a)

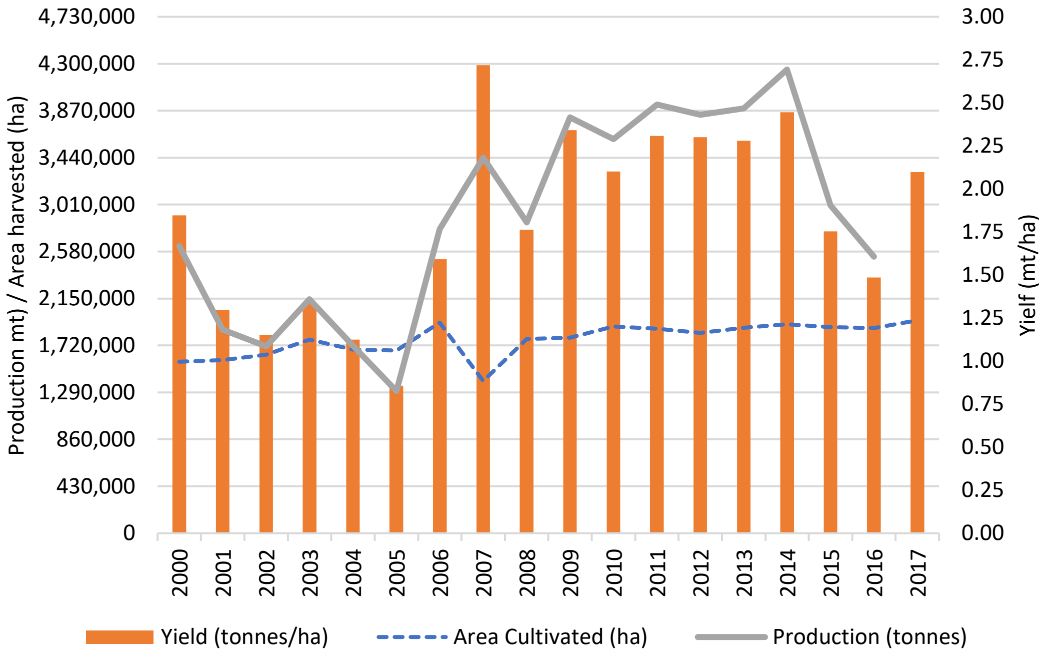
[5] (Source: Chirwa and Dorward, 2013)

Direct Impact

By looking at production data alone, there appears to be considerable progress since the early 2000s (Figure 4). From 2000 to 2005, the average maize yield achieved was 1.27 mt/ha. This increased considerably to 2.01 mt/ha between the years 2013 to 2017. This increase in yield continued despite the relatively stable trend in the amount of land allocated to maize production. Parallel to this, the prevalence of undernourishment remains stable with a three-year average of 26.4 per cent between 2001-2002 and 26.3 per cent between 2015-2017, and minimal variation in between these periods (FAOSTAT, 2019). With this, the prevalence of severe food insecurity was at 52.4 per cent of the population between 2015-2017 (FAOSTAT, 2019).

Considering that the main objective of the FISP was to enable households to meet their own basic food needs through increased maize productivity, the underlying figures available show two different pictures. Firstly, an increase in maize productivity and production has been achieved; if the available data is valid, farm-level data show more modest maize production increases (Lunduka, Ricker-Gilbert and Fisher, 2013). Secondly, despite increases in productivity and production, basic food needs remain largely unmet for a considerable proportion of the population.

Figure 4: Maize Production, Area Harvested and Yield in Malawi (2000-2017)[6]



There are both positive and negative findings in the literature which focused on the FISP and its impact. One of the negative findings reported included several instances of how better-off households gained significantly more from the FISP than poorer households (Lunduka, Ricker-Gilbert and Fisher, 2013; Dabalen *et al.*, 2017b). Another adverse finding queried how, at the farm level, there are modest response rates to be gained from the fertiliser use from FISP. Results showed that, on average, the maize-fertiliser response rate is 2.7 kilograms of grain per kilogram of subsidised fertiliser acquired by households, which is only 50 per cent of the government's expected maize-fertiliser response rate of 5 kilograms (Ricker-Gilbert, Jayne and Chirwa, 2011; cited by Dabalen *et al.*, 2017). Given the unbalanced budget allocation within the agricultural sector, there are concerns that the inadequate provision of information to farmers is having a 'knock-on' effect on the farm-level response rates (Lunduka, Ricker-Gilbert and Fisher, 2013; Ragasa and Mazunda, 2018). Together these findings cast doubt on the FISP's ability to reduce food insecurity and poverty (Lunduka, Ricker-Gilbert and Fisher, 2013).

[6] Source of raw data: FAOSTAT accessed on 17/04/2019. Figure updated from (Ragasa and Mazunda, 2018)

Despite this, the FISP has been credited with increasing crop diversification. National-level data from the 2004-2005 and 2010-2011 seasons show that crop diversification at the Agricultural Development Divisions (ADDs) level is decreasing; however farms that participated in the FISP showed greater crop diversification (Kankwamba, Kadzamira and Pauw, 2018). It is assumed that this is due to the incorporation of legume seeds in the FISP package. The rationale behind this inclusion of legumes was two-fold: to improve household nutrition through increased access to plant-based protein for their diets, and by using legumes - improve soil fertility and to mitigate the effects of land degradation and climate change (Kankwamba, Kadzamira and Pauw, 2018). An additional benefit was the realization that in many regions of Malawi, legumes like groundnuts, soya bean, and others are considered as both a food and a commercial crop that can be used as a source of income (Kankwamba, Kadzamira and Pauw, 2018).

Indirect Impact

Estimating the indirect impact or potential spin-off impact that the FISP has had in the broader food security and economic situation in Malawi is difficult. When discussing input subsidy programmes in general, Lunduka, Ricker-Gilbert and Fisher (2013) summarise that in theory, subsidisation would reduce costs for those who cannot afford inputs, thus lessening farmers' financial capital constraints and increasing input profitability, while encouraging adoption of improved seeds and fertiliser which will, in turn, boost productivity. However, they add that the cost of implementing large scale programmes like the FISP may outweigh the long-term benefits. The main reason they attribute to this is the funding imbalance and how other agricultural investments that have the potential to contribute to more sustainable agricultural development are neglected.

Unfortunately, it is difficult to find a definitive analysis of the economic efficacy of the programme. The issue of unreliable production data has been raised already. Nkhoma, Bosman and Eduful (2019) state that besides the validity of the data, the role played by the FISP in increasing production is questionable - as this could be attributed to a few exceptionally good years of weather. In addition to this, there were only relative increases in real maize prices, and maize imports continued during the majority of FISP seasons.

Several studies use cost-benefit analysis to investigate this, although the methods and results vary. In the extensive 2013 Chirwa and Dorward evaluation of the FISP, different contextual specifications were used in the various models; all cost-benefit ratios were consistently above 1, averaging at 1.35. For the same period, Jayne and Rashid (2013) reported a ratio of below 1, with Arndt, Pauw and Thurlow (2016) more recently reporting an economy-wide CBR of 1.62.

Inconsistent cost-benefit ratios aside, numerous Chirwa and Dorward studies, which focused on the FISP over the past decade, point to the context-specific challenge that Malawi has. They argue that Malawi is 'locked up' in a low maize productivity maize trap (LMPT). This is then compounded by instability in inter-year maize prices. Consequently, this makes maize an unattractive crop for producers that can produce a surplus (i.e. grow maize as a cash crop). The outcome causes low production, drives prices up, and forces maize deficit farmers to grow as much as they can regardless of being able to afford improved seed and fertiliser. This then results in the current situation where 60 per cent of the smallholder farmers are net buyers of maize, while only 10 per cent are net sellers (Chinsinga, 2012). The FISP has the potential to break this LMPT. However, the design and inefficiencies described earlier would need to be addressed.

Recommendations from the Literature

Despite there being much written criticising the FISP, there is an acknowledgement that the full potential of the FISP has yet to be fully exploited (Chirwa and Dorward, 2013; Asfaw *et al.*, 2017). There are numerous recommendations in the literature for improvements. The most common one is around the targeting criteria. Asfaw *et al.* (2017) highlight targeting as being the main structural crux to review, in order to enhance the programme effectiveness. One suggestion to improve efficiency is to remove the ultra-poor from the targeting and instead provide them with alternative, more appropriate, safety net programmes which will help build human capital and address current basic needs (Asfaw *et al.*, 2017).

The FISP impact on improved crop diversity is commendable. This can be further leveraged by recognising the specific agro-ecological zones and tailoring the inputs to each zone, thus, increasing the productivity of the various staple for crops in different areas (Kankwamba, Kadzamira and Pauw, 2018).

Other recommendations worth noting include the alignment of the FISP to the 2018 National Agricultural Policy, the integration of the promotion of fertiliser use, crop diversification and sustainable land management, the provision of affordable credit and functioning markets for financial services, reduction of the number of beneficiaries by changing the targeting criteria, as mentioned above, and/or reduction of the level of the subsidy provided (Chinsinga, 2012; Pace *et al.*, 2017).

Summary

This chapter provides an overview of the food security, poverty and rural economy of Malawi coupled with an exploration of recent trends and challenges. In the past 20 years, Malawi has seen mostly volatile growth. Dabalen *et al.* (2017b) attribute this to unstable macroeconomic conditions such as high inflation, fiscal deficits and high-interest rates.

The related national policies and approaches which have evolved since independence are discussed. A chronological review of the agricultural and rural development policies is presented, followed by a detailed analysis of the leading social protection strategy of the past decade, the Farm Input Subsidy Program (FISP). There is a plethora of policy documents, strategies and action plans that target rural development, agriculture and smallholders. However, The National Agricultural Policy (NAP) is likely to have the most direct impact on the development of the smallholder farming sector. The current policy aims to provide clear and comprehensive agricultural policy guidance from 2016 to 2020. The National Agricultural policy is the cornerstone policy for agricultural and rural development. However, the primary focus of this spending was the Farm Input Subsidy Programme (FISP). Despite national statistics showing marginal increases in productivity and reduction in undernourishment, the debate around the efficiency and effectiveness of the FISP goes on at the national and international level. This debate is compounded by the fact that every year there is a subset of Malawi's population in need of emergency food assistance. This chapter provides a detailed review of the literature around the FISP along with common recommendations.

Overall, the contents of this chapter provide an understanding of the political economy and the influence this has on the livelihoods and livelihood outcomes of Malawi's rural households.

Chapter 4: Methodology

This chapter provides a detailed description of the research methodology used and limitations encountered. An iterative mixed-method longitudinal approach was taken for this study. Data from the 2008-2009 cropping season through to the 2012-2013 cropping season was collected. Data was collected on an annual basis in 2010, 2011, 2012 and 2013. The target population included approximately 3,000 smallholder farming households in three districts – Mchinji, Lilongwe and Salima. The study was designed in 2010 and was guided by the sustainable livelihoods framework which has been extensively written about and used in development studies and interventions since its emergence in the early 1990s (Devereux, 2001, Carney 2002, Devereux, 2004, Scoones, 2009, Maxwell, et al. 2013, Levine, 2014, Bhatasara, 2018). Components of the sustainable livelihoods framework were used in the study design to enable exploration of trends over the study period and differences between male-headed and female-headed households.

The quantitative annual household questionnaire is the main source of data for the study. However, focus group discussions, semi-structured interviews and observations were conducted in the 2012 and 2013 rounds to supplement the quantitative dataset with qualitative data. This mixed-methods approach was taken with the aim of improving the accuracy of findings and providing a complete picture, particularly around; gender norms, access to and perception of policies, institutions, process and structures (PIPS), and chosen livelihood strategies. Along with qualitative data, some secondary data is employed to investigate the external and macro-level variables that may influence results.

The four-year longitudinal study collected data on key variables and livelihood outcomes from the same households, some of whom were participating in the Valid Nutrition groundnut value chain intervention outlined in Chapter 1. The longitudinal data provided insight into livelihood strategy and outcome trends and what influenced these. It was thought that a once-off cross-sectional study would not be able to provide this.

Study Design

The original study design was led by Dr Nick Chisholm and Mike Fitzgibbon of University College Cork's Department of Food Business and Development. The study was undertaken in partnership with Valid Nutrition and funded by Irish Aid. To manage the research project, it was envisaged that a research masters student would oversee the data collection management, analysis and write up of the research project and then use the project to inform their master's thesis. In 2010, the student appointed was Michael Magee, followed by Emmanuel Eze in 2011, and finally in 2012 Gretta Fitzgerald (author of this thesis) was appointed to the study. After the 2012 fieldwork in Malawi, Gretta Fitzgerald upgraded her research masters to a PhD and completed the final year of data collection, synthesised all four years of data and organised the dissemination of the research findings.

One of the main features of this study is that it is longitudinal by design. Ruspini (1999a) notes that longitudinal is an inclusive term, but goes on to cite Menard's (1991, p4) definition as "… *research in which: (a) data are collected for each item or variable for two or more distinct periods; (b) the subjects or cases analysed are the same, or at least comparable from one period to the next; (c) the analysis involves some comparison of data between or among periods*".

Considering the relative, multi-dimensional and dynamic nature of poverty - measuring it, historically, has been fraught with difficulty and controversy (Ruspini, 1999b). The use of lifecycle and longitudinal data, particularly household-level panel data, can offer the possibility of detecting and establishing the nature of change in household wellbeing overtime. It also provides the opportunity of investigating the way in which households respond to circumstances and events, which can be the cause of households and individuals either falling into or escaping poverty (Ruspini, 1999b). Since poverty can be a persistent condition for some households, but only a temporary, or recurrent condition for others, understanding this dynamic aspect of poverty is especially important in the design and implementation of policies aimed at poverty alleviation (Ruspini, 1999b).

The decision to pursue a longitudinal study design as opposed to other methods was strongly influenced by the original research project and the groundnut value chain intervention. The original research project was primarily concerned with showing how the intervention influenced the food security and poverty status of households over time. This thesis broadens the scope of the data analysis and looks comprehensively at all aspects of the livelihood system and how the characteristics and outcomes change over time.

Along with the longitudinal approach, to strengthen the validity of the study, a sequential mixed-methods approach was taken. Mixed methods are, where both quantitative and qualitative data are collected and analysed in an integrated way with the aim of gaining a better understanding of the research problem (Nataliya, Creswell and Stick, 2009). The literature argues that neither quantitative nor qualitative data are sufficient by themselves in capturing trends and explanations of anomalies or differences. (Green, Caracellie and Graham 1989, Miles and Huberman 1994, Tashakkori and Teddlie, 1998 cited by Nataliya, Creswell and Stick, 2009). When used together, the two methods complement each other and allow for a more robust analysis by taking advantage of the strengths of each. The longitudinal nature of this study allowed for the use of sequential data collection and analysis; hence the quantitative data analysis informed the qualitative inquiry of the following study rounds. The pairing of both methods allowed for the study to probe deeper into what was the causation of livelihood changes than either qualitative or quantitative methods would have done in isolation (Baulch, 2011). This was especially the case in 2012 and 2013, where the fieldwork was managed by the same person (the author), and the data collection was carried out by the same enumerators. This allowed the team to use their knowledge and experience from 2012 in 2013, and to build rapport with the local communities.

Another feature of this study design was the use of the household as the main unit of measurement, which is commonplace in poverty and food security studies. There are advantages and disadvantages to this, as outlined by Ruspini (1999). The family can play the role of social protection; however, this can lead to it masking the true extent of poverty or inequality. As the family acts as a safety net against poverty and social exclusion, this system is based on social connections and networks of exchange that are often difficult to detect let alone measure — considering that inequalities exist within households, with female members tending to perform most unpaid domestic work and caring of dependants. Therefore, although the household is a useful unit of measurement, it has its limitations in being able to provide insights into what goes on within the household in terms of three key domains underlying unequal gender dynamics. Firstly, access and control over resources, secondly decision-making process, and thirdly time use and allocation. Considering these limitations, the study design included several specific independent variables with the aim of shedding light on the first and second key domains listed above. The third domain was, unfortunately, beyond the scope of this study.

Study Area and Sampling Design

In the latest national census in 2008 Malawi had an estimated population of 13,066,320, with a landmass of 94,276 km2. It has a population density of approximately 215 people per km2 and a predicted annual population growth rate of 2.8 per cent (National Statistical Office, 2008). In 2010, 50.7 per cent of Malawi's population was classed as living below the national poverty line (World Data Bank, 2018). Malawi has a sub-tropical climate, which is reported as being relatively dry and strongly seasonal by the Department of Climate Change and Meteorological Services. The warm-wet season stretches from November to April, during which 95 per cent of the annual precipitation takes place. Annual rainfall is estimated to be between 725mm and 2,500mm, with temperatures varying between lows of 4-10 degrees Celsius to highs of 25-37 degrees Celsius (Department of Climate Change and Meteorological Services, 2018). This study focused on three of Malawi's twenty-eight districts that fall under its three regions. Lilongwe, Mchinji, and Salima are in Malawi's central region (Figure 5). An overview of the three study districts is given below.

Lilongwe

Lilongwe is the most populous of the three study districts with 1,230,834 people making up an estimated 275,194 households, with a population density of 216 people per square kilometre. The district itself covers a land area of 5,703 square kilometres. The Central Statistical Office (2005) estimates that 37.5 per cent of Lilongwe's population is poor and has a child mortality rate of 68. More recent estimates from the 2015-2016 Integrated Household Survey reported that 62.5 per cent of Lilongwe's population is extremely food insecure (Central Statistical Office, 2016).

Lilongwe's rural economy is predominantly made up of rain-fed crop production and to a lesser extent, livestock (FEWSNET, 2015). Maize, sweet potatoes, groundnuts, and soya are the main food crops. Tobacco is still the main cash crop, although more so for wealthier households who hire others to assist in the cultivation and processing. The land is cultivated by hand, and land preparation and weeding are the most labour-intensive activities undertaken throughout the year (FEWSNET, 2015).

FEWSNET (2015) highlighted that, although the district of Lilongwe can be classified as an agricultural zone, production potential is relatively poor, and households depend on more than just crop production to meet their year-round food and cash requirements. Other livelihood strategies pursued include; selling baked goods, collecting and selling firewood or charcoal, making bricks, construction, or working on other farmers' land, including the estate sector. Much of this work is influenced by seasonal demand. The inadequate crop productivity, combined with increasing land pressure means that year by year, the need for viable diversification of livelihood strategies becomes more acute (FEWSNET, 2015).

Mchinji

Mchinji is the second most populous with 456,516 people, making up an estimated 97,209 households, with a population density of 136 people per square kilometre. The district itself covers a land area of 3,356 square kilometres. The Central Statistical Office (2005) estimates that 59.6 per cent of Mchinji's population is poor and has a child mortality rate of 66 per cent. Again, more recent estimates from the 2015-2016 Integrated Household Survey reported that 62.2 per cent of Mchinji's population is extremely food insecure (Central Statistical Office, 2016).

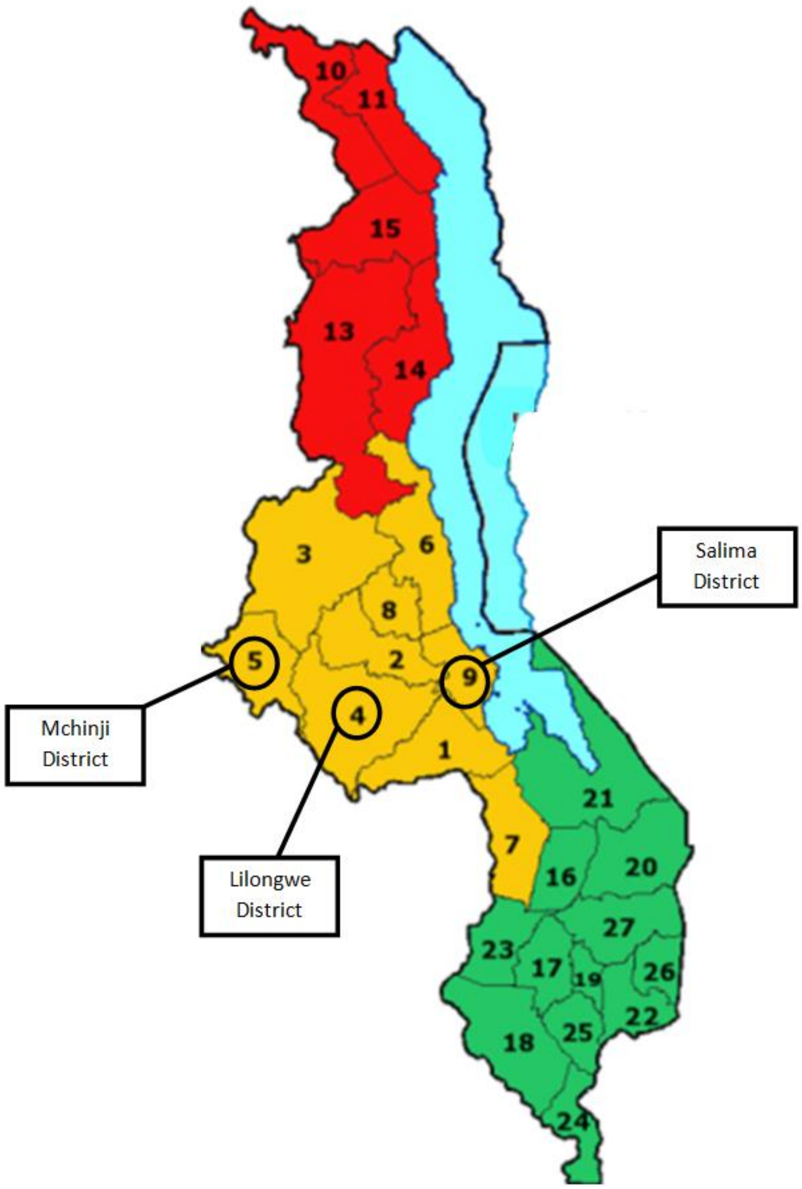
Mchinji local economy is very similar to that of Lilongwe - what was said above is applicable here also, with the added cross border exchange with Zambia to its west.

Salima

Salima, is the least populous of the three districts with 456,516 people, with an estimated 97,209 households and a population density of 136 people per square kilometre. The district itself covers a land area of 2,196 square kilometres. The Central Statistical Office (2005) estimates that 57.3 per cent of Mchinji's population is poor and has a child mortality rate of 65. More recent estimates from the 2015-2016 Integrated Household Survey reported that 61.5 per cent of Salima's population is extremely food insecure (Central Statistical Office, 2016).

Salima's economy is like Lilongwe and Mchinji's. Although there are lost production potentials in all three study districts, for Salima, the lakeshore district also has a relatively hot climate and poor rainfall which contributes to infertile and sandy soil - exacerbating the production challenges.

Figure 5: Map of Malawi with Study Districts Highlighted



Selection of Villages & Households

The villages and households were selected for the study sample in March 2010. Michael Magee, the original masters student, appointed to oversee the study in 2010, designed the sampling criteria. The criteria weres guided by the Valid Nutrition, ExAgris Africa groundnut out-scheme and the research study objective. The three-study districts were chosen because this is where ExAgris Africa was mainly implementing its out-grower programme from their commercial estates.

In Lilongwe, villages surrounding the ExAgris Lisungwi Estate were selected. This estate is approximately 100km south of the capital city Lilongwe and 20km from Mitundu trading centre, which is one of the main trading centres for the Lilongwe district. The selected villages fall under the Mitundu EPA[7]. Originally 30 villages were selected (Table 2).

Villages in Mchinji adjacent to the ExAgris Mchaisi Estate were selected. This estate is approximately 50km east of Mchinji town and 5km from the Kapiri trading centre. The selected villages fall under the Chioshya and Kalulu EPAs. Originally eight villages were selected (Table 2).

Villages in Salima surrounding the ExAgris Mphatsana Njoka Estate were selected. The estate is approximately 5km outside of Salima town. The selected villages fall under the Tembwe EPA. Households were drawn from 12 different villages. Originally 13 villages were selected (Table 2).

When the sample was initially designed in 2010, farmers who were members of the ExAgris out-growers association were randomly selected. To provide a counterfactual sample farming household from the same villages that were not members of the association were also selected. 66 per cent (156 households) of the original sample were association members, and 34 per cent (82 households) were not members (Table 2). The original counterfactual sample is not used in the thesis analysis, as some of the

[7] Extension Planning Area is the lowest government planning level in Malawi.

original non-members became members of the associations and some of the original members dropped out of the associations over the study period. Instead, the entire sample was analysed as one standalone cohort. However, in Chapter 7, association membership is analysed. Table 2 shows the breakdown of the sample by district. The original sample was made up of 238 households; this figure declined over the four years as households moved away, broke-up or were not available for interview. These households were included in the analysis (see Table 2 'Analysed'). The final sample of 195 consists of households that participated in the four household questionnaires, allowing for a confidence interval of 95 per cent and a margin of error of 6.8 per cent. The reduction in sample size from the baseline to the final survey round resulted in an 18.07 per cent attrition rate. Each year the household list was shared with the local ExAgris Africa agricultural extension officers who were responsible for the management of the out-grower schemes. The ExAgris Africa extension officer mobilised all households in advance of the data collection.

Table 2: Sampling Breakdown by District

		Villages	Male Households	Female Households	Ass. Members	Non Members	**Total**
Lilongwe	Original	30	52	30	52	30	**82**
	Analysed	28	44	22	44	22	**66**
Mchinji	Original	8	51	31	52	30	**82**
	Analysed	6	43	27	48	22	**70**
Salima	Original	13	54	20	52	22	**74**
	Analysed	12	39	20	39	20	**59**
Total	**Original**	**51**	**157**	**81**	**156**	**82**	**238**
	Analysed	**46**	**126**	**69**	**131**	**64**	**195**

Methods Employed

Data collection methods included annual household questionnaires, focus group discussions, semi-structured interviews, market visits, and direct observation. The details of each are as follows:

Quantitative Methods Employed

The main source of quantitative data was the household questionnaire. This was originally designed in 2010 by Michael Magee, with the support of supervisors from

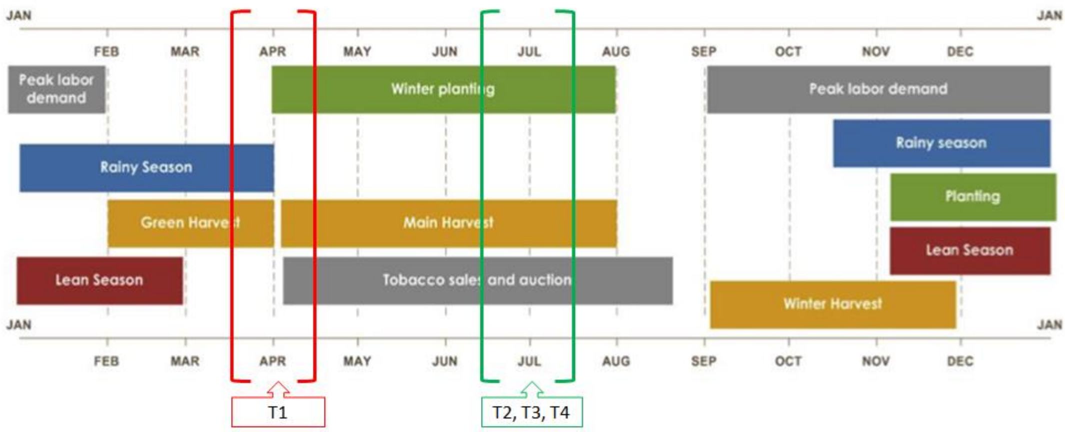
UCC and Valid Nutrition. The original design was based on the research study objectives and was paper-based, in English, to be administered to participants by local enumerators in the local language. In 2011, the questionnaire was transferred to a digital data gathering (DDG) platform (more details on this under the Data Collection section). This was overseen by the 2011 researcher Emmanuel Eze. To take advantage of the digital questionnaire capabilities, some questions were added to the 2011 questionnaire based on reflection and learning from 2010. All questions asked in 2010 were maintained to ensure compatibility across the four years. In 2012 and 2013, the author of this thesis took over the management of the research study and replicated the digital questionnaire from 2011.

Household Questionnaire

The questionnaire consisted mainly of closed questions; numeric, single or multiple-choice, with a small number of open-ended questions. The extensive questionnaire covered the following topics: household roster, illness experienced, labour and migration, housing, water and sanitation, ownership of durable goods, non-food expenditures in the last 12 months, access to social safety nets in the last 12 months, non-agricultural enterprises, access to savings and credit in the last 12 months, shocks experienced in the last 12 months, participation in coordinated agricultural services, Household Food Insecurity Access Scale (HFIAS), household food consumption in the last seven days, crop production and sales, livestock ownership and sales, land ownership and cultivation.

2011, 2012 and 2013 household questionnaires largely replicated the 2010 baseline. The time of data collection changed to June/July, as opposed to March to mid-May, to enable real-time information to be generated on groundnut yields and prices immediately post-harvest. However, the timing of data collection also meant that data collected on food security status and consumption levels tended to reflect the more favourable situation prevailing in the post-harvest period, rather than the inferior conditions likely to exist during the lean season (which were captured in the baseline data). This seasonal effect needs to be kept in mind when considering the survey results (Figure 6).

Figure 6: Seasonal Comparison of Data Collection Times



Household interviews were carried out by local enumerators using a quantitative survey, with the household as the main unit of analysis. For this survey, households were defined as a group of individuals who normally eat their meals together. In the context of polygamy, which is widespread in the region, households who were members of the associations were sampled by the named household member involved in the association. For those who were not members, the household head was selected. By using the sampling lists, each year, efforts were made to interview the same respondent interviewed in every round of the survey.

Qualitative Methods Employed

Qualitative data collection was carried out in all years of the study. However, only qualitative data collected by the author in the 2012 and 2013 fieldwork is used in this thesis. The author designed the qualitative data collection tools for the research in 2012 and 2013; these are included in Annexe 5. The design of these tools was informed by the Household Economy Approach with the aim of answering the study research questions (Holzmann and Boudreau, 2000).

Guided by Table 3, participants in the qualitative data collection were purposively identified and invited to participate by the local ExAgris extension officers. All attempts were made to avoid inviting households that were involved in the household questionnaire as it was felt this would contribute further to survey fatigue. Therefore, community representatives from the same communities, but not on the household questionnaire sample list, predominantly participated in the qualitative data collection exercises.

When considering how much qualitative data collection to carry out, there were two determining factors. Firstly, time limitations, approximately one week to ten days, was available for qualitative data collection in 2012 and 2013 which restricted the scope of the data collection. Secondly, once the point of saturation was achieved with certain topics or groups, data collection was deemed completed for that specific topic or group.

Table 3: Qualitative Data Collection by District

Group Participants	Group size	Groups by District			Total
		Lilongwe	Mchinji	Salima	
Community Representatives	6 – 12	1	1	1	3
Association Members	6 – 12	1	1	1	3
Female Only	6 – 12	1	1	1	3
Village Heads	6 – 12	1	1	1	3
Key Informants	1	1	1	1	3
Market visits & Trader Interviews	N/A	1	1	1	3

Focus Group Discussions

Focus group discussions (FGDs) were conducted to provide a more comprehensive contextual picture of the communities that the studied households resided in. The FGD guides were designed by the author using examples from the Household Economy Approach with the aim of answering the study research questions (Holzmann and Boudreau, 2000). A local translator and facilitator was recruited and trained to support in the facilitation and note-taking of the FGDs. This person facilitated the FGDs in Chichewa, taking notes where possible, but also translating for the author who was observing and taking notes in English. Finally, the author carried out the transcribing of all the FGD notes.

Groups were made up of 6 to 12 members in all three study areas (Table 3). Discussions were held with different groups of people, for example, village heads, women only, association members, and general community representatives –

depending on the topic for discussion. Participatory rural appraisal exercises (PRA) comprising of wealth ranking, seasonal calendars, income and expenditure matrixes, and institutional mapping were conducted in specific FGDs. These were informed by the study research questions and Household Economy Approach (Holzmann and Boudreau, 2000). The FGDs tools can be found in Annexe 5. The design of the FGDs ensured that the author could an insight into the community and individual perceptions of what strengths, weakness, opportunities and threats households face, in terms of achieving a sustainable livelihood and what influences each of these. Considering the low literacy levels in the study area, techniques like proportional piling, the use of flip charts and pre-prepared pictorial diagrams were used.

Semi-Structured Interviews

In 2012 and 2013, three key informants were interviewed with the aim of capturing individuals' perspectives and experiences. The three key informants were the ExAgris agricultural extension advisors who were responsible for the management of the out-grower schemes in the respective districts of Lilongwe, Salima and Mchinji. The interviews were carried out directly by the author and were guided by data collection Tool 5 included in Annexe 5.

Market Visits and Trader Interviews

Each year the commodity markets in the three areas were visited by the author and the team of enumerators. The household survey team visited the nearest small markets and the medium to large markets located further away from the study sites. The latter is also known as trading centres. With the translation support of the local enumerators for the household survey, the author completed Tool 6 Market Visits and Trader Interview included in Annexe 5. The aim in both 2012 and 2013 was to conduct at least one market visit per district.

Direct Observation

In the 2012 and 2013 fieldwork, the author recorded events, structures, processes, institutions, behaviour, relationships, social differences, and used enumerators' notes and the author's observations from household interviews. This was done to inform the survey data collection processes and to triangulate the other methods employed.

Study Ethics

The ethical considerations that underpinned the study were that all participants would remain anonymous, all data would be treated as confidential and safely stored, the researcher would be responsible for ensuring that the participants understood the nature of the research and their involvement, and finally, participants would voluntarily consent to be involved (Annexe 6).

For all the data collection activities, verbal consent was obtained from all participants. Locally, this is deemed the most appropriate way of ensuring a standardised consent process that takes into consideration the low levels of literacy. For the household questionnaire, a standardized introduction was read out by the enumerator; this introduction gave a background to the research, the purpose of the study, how the information would be used and assurance that all information would be treated confidentially (Figure 7). This procedure was replicated for FGDs and semi-structured interviews. Participants were informed that they were entitled to ask questions, and if at any time they wanted to terminate the interview, they could do so, or if they wished, decline to participate altogether. In accordance with local customs, participants in the household questionnaire were reimbursed for their time each year with the equivalent rate for a day's labour (approximately $1 USD). Similarly, those participating in interviews or focus group discussions, which required them to travel away from their homes for more than a couple of hours, were provided with snacks and drinks.

In 2012 and 2013, the author instilled the expectation that she and the local enumerators and anyone supporting the fieldwork abide by a certain expected standard. When dealing with research participants and the local communities, the fieldwork team were expected to be open and honest and to uphold good standards of science and not to manipulate the data in any way. The field team were briefed on this prior to signing their contracts and reminded of this on a day-to-day basis. For the fieldwork preceding 2012 and 2013, the author cannot speak for how the team was managed, however, it is expected that the same standards were maintained.

Figure 7: Informed Consent Script

Hello my name is ______ and I am from ________. Since 2010 Valid Nutrition has been assessing the effect of assured markets (e.g. groundnut markets) on livelihoods and food security. Your household was selected either because you are a member of a farmers' association OR you were selected randomly by extension workers and your local leaders. All the information you give is treated in COMPLETE CONFIDENCE and your name will not be used unless specific permission is given by you. Your information will only be used to assess the effects of the current markets on your livelihoods - i.e. no commercial exploitation by Valid Nutrition. You can choose not to answer any questions and you can stop the interview at any time. All of your responses are confidential. This interview should take approximately one hour. Would you like to ask me anything else about the survey? ☐ Yes (proceed with survey) ☐ No (do not proceed with survey, reassure and thank participant. Then move to the next household on the list)

Data Collection

During the 2010 baseline, the researcher, Michael Magee, validated the questionnaire with key stakeholders and a local translator. This was repeated each year by the respective researchers, though less intensively as the questions remained largely the same after the baseline.

The baseline was carried out using the traditional paper-based data collection approach, with the following three years being collected using digital data-gathering technology. This technology allowed for automatic data entry to excel, which increased validity, and reduced data collection and data processing times.[8] Each year, four enumerators were recruited, with the assistance of the Centre for Agricultural Research and Development (CARD) in Lilongwe. The appointed researchers led the training of the local enumerators and the piloting of the survey. Four days were allocated for the training each year and one day for a pilot in the Lilongwe study area. The same enumerators were employed for the 2012 and 2013 data collection rounds, which contributed to consistency in the understanding and application of the questionnaire. Each year the data collection took four to five weeks to complete. Using the digital data-gathering technology, the interview lasted approximately an hour, with each data collector typically completing three to four interviews a day.

Data Analysis

For all study years, the data only refers to the population directly targeted by the ExAgris intervention in the sampled villages of the three districts. Thus, the data are not representative of the districts only representative of the populations residing within the villages participating in the ExAgris groundnut out-growers scheme. Results from the household questionnaire dataset are disaggregated by the gender of the household head. Later on in the thesis, results are also disaggregated by asset ownership quartiles, a proxy for poverty status.

Descriptive Statistics

Using the household questionnaire data, frequency percentages and means are used in the data analysis to understand the socioeconomic characteristics of the studied households and how these changed, or did not change, over time. Correlations and differences over time and between genders of household head are investigated through descriptive statistics.

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[8] For further information around the digital data collection process see appendix for Fitzgerald and Fitzgibbon (2013) 'The Evolution of Digital Collection in the Monitoring and Evaluation of Projects in Developing Country Contexts'

Statistical Tests for Significance

Specific tests were used to examine the existence of statistical significance of results. The main statistical tests employed are listed below:

- Paired sample t-test - this test explores if there is a statistically significant difference in the mean results for two-time points (e.g. has household's dietary diversity score increased significantly between 2010 and 2013).
- Independent sample t-test - this test explores if there is a statistically significant difference in the mean results for two groups of people (e.g. whether male-headed households and female-headed households differ significantly in terms of their dietary diversity score).
- One-way repeated measures ANOVA - this test examines if there is a statistically significant difference in a set of scores and at which time point was there a significant change (e.g. has household's dietary diversity score increased significantly between 2010, 2011, 2012, and 2013).
- Chi-square test - this investigates if there is an association between two categorical variables (e.g. male/female-headed households, owns livestock/does not own livestock – are male-headed households more likely to own livestock?)
- McNemar's test - examines the association between a categorical variable and time (e.g. if a proportion of households owning livestock changed from 2010 to 2013?)

Correlation and Regression Analysis

Both correlation and multivariate regression models are employed to answer the higher-level research questions. Spearman rho correlation analysis is used to investigate the existence and strength of relationships between variables (Hoddinott and Yohannes, 2002). Standard multiple regression is utilized to investigate the level of influence specific dependent variables have on independent variables. Independent variable included in the regression models were selected on the basis of their strength of the relationship with the dependent variables.

Ordinary Least Square (OLS) regression was used for all the Household Asset Score regression models because the Household Asset Score is a continuous dependent variable; and there are two or more independent variables, which are either continuous (i.e., an interval or ratio variable) or categorical (i.e., an ordinal or nominal variable) (Maxwell, Coates and Vaitla, 2013; Manlosa *et al.*, 2019).

Negative Binomial Regression was used for all the Household Food Insecurity Access Scale (HFIAS) regression models because the HFIAS variable is a count variable that does not follow a Poisson distribution; and there are two or more independent variables, which are either continuous or categorical (Cameron and Trivedi, 1998; Krishna, 2015; Koppmair, Kassie and Qaim, 2017; UCLA, 2019)

Poisson regression was used for all the Household Dietary Diversity Score (HDDS) regression models because the HDDS variable is a count variable that does follow the Poisson distribution; and there are two or more independent variables, which are either continuous or categorical (Cameron and Trivedi, 1998; Krishna, 2015; Koppmair, Kassie and Qaim, 2017; UCLA, 2019).

Thematic Analysis

For the qualitative data from 2012 and 2013, thematic analysis was carried out by the author. The process involved the identification of patterns or themes in the notes and transcripts collected during the fieldwork and written up in Microsoft Word. The author first identified broad themes or topics, then within these sub-themes were identified and cross-checked across sources and other themes (Maguire and Delahunt, 2017). Then final themes were defined. The qualitative findings under each of the defined themes were used to compliment the quantitative findings, especially in Chapter 5.

Presentation of Results

Descriptive statistics, predominantly percentages and means, are presented in a table or figure format. Any significant differences are highlighted in grey and annotated with either one, two or three, asterisks indicating the level of significance found. Details of the appropriate statistical test and p-values are provided in the narrative around the table or figure. The p-value is the probability of finding the observed difference if the observed difference did not actually exist, so the smaller the p-value, the more significant the difference. More detailed statistical analysis is provided in Annexe 1. For data where the unit of measurement was in Malawian Kwatcha, the value for the data in 2011, 2012 and 2013 was deflated using Malawi's National Statistical Office Annual Consumer Price Index to mitigate the impact of inflation. The conversion rates are shown in Annexe 2. Table 4 summarises the relevant variables by the research question and indicates what analysis will be carried out for each. Table 4 summarises the relevant variables by the research question and indicates the quantitative analysis carried out for each. Where qualitative data is available, it is used to supplement and add to the quantitative results.

Table 4: Data Analysis Plan

Research Question	Variables	Analysis
1. What assets do households utilize to pursue their livelihood strategies? Does this differ by the gender of the household head?	Independent Variables: Household demographics; Health status; Land ownership & cultivation; Access to water & sanitation; Livestock ownership & sales; Access to savings & credit; Crop production & sales; Paid employment; Non-agri enterprises; Migration & remittances; Household-level shocks & ability to respond; Decision making	Descriptive statistics; Paired samples t-test; Independent samples t-test; One-way between-groups or One-way repeated measures ANOVA for Time (T1, T2, T3, T4); McNemar's test; Chi-square test
2. Were there any significant changes in the household's food security and asset ownership over time? How does this differ by gender of household head and levels of asset ownership?	Independent Variables: Gender of household head; Household Asset Score Quartile Dependent Variables: HDDs; HFIAS; Assets Score	Descriptive statistics; Paired samples t-test; Independent samples t-test; ANOVA; McNemar's test; Chi-square test; Correlation; Standard multiple regression
3. How do household characteristics and livelihood strategies influence food security and asset ownership outcomes?		
4. Over the study period, what agricultural change processes were utilized by households? How do these differ by gender of household head and levels of asset ownership?	Independent Variables: Production diversity score; Crop species count; Distance to markets (km); Share of maize sold; Share of other food crops sold; Access to extension services; Association participation; FISP support; Improved maize varieties; Chemical fertiliser use; Post-harvesting processing knowledge Dependent Variables: HDDs, HFIAS, Asset Score (2012, 2013)	Descriptive statistics; Paired samples t-test; Independent samples t-test; One-way between-groups or One-way repeated measures ANOVA for Time (T1, T2, T3, T4); McNemar's test; Chi-square test; Correlation; Standard multiple regression
5. Did the agricultural change processes that were utilized by households influence their food security and asset ownership?		

Measurement of Livelihood Outcomes

To measure changes and differences in livelihood outcomes three main variables were selected for investigation in the study; two of these are focused on food security, and one non-monetary poverty measurement variable called the Household Asset Score - which is described below. There are two food security variables for two reasons; firstly, each variable used tells us about a different aspect of food security and secondly because no single variable adequately measures food security (Kahsy, 2017; Hirvonon et al., 2015; Maxwell et al., 2014; Carletto et al., 2013; Coates 2013; FAO/WFP/IFAD, 2013; Kennedy., 2013).

Household Asset Score

The household asset score is a non-monetary variable designed as a proxy for household wealth using data on ownership of key livelihood assets. Although poverty research commonly uses measures based on monetary income and expenditure, this approach is argued to have limitations around being able to address the multi-dimensional nature of poverty (Ruspini, 1999b). Monetary variables also are seen as static, a snapshot of a particular point in time, an insensitive indication of long-term poverty (Baulch and Massett, 2002). With this, considering the difficulty in collecting information on household expenditure or income, particularly in settings where most households rely on highly seasonal subsistence agriculture and casual labour, non-monetary indicators have been shown to be a good wealth proxy due to these issues and problems with recall, reluctance to divulge information, volatile prices across relatively short time frames and geographical areas, resulting in the need for com (Morris et al. 1999, Ruspini, 1999). A non-monetary variable is achieved by collecting data on a select number of household characteristics, for example, food consumption, housing conditions, access to sanitation, and ownership of consumer goods, health, and education.

However, the merits of both monetary and non-monetary measure are highly contested. Kim (2019) provides a review of numerous studies that have investigated how each measurement approach compares and is correlated. This review found that many scholars have queried whether a monetary or a multidimensional non-monetary measure can act as an appropriate proxy for each other and thus provide a sufficient understanding of poverty and its transitions (Clark and Hulme 2005; Hulme and Shepherd 2003; Laderchi et al. 2003; cited by Kim, 2019). With regard to the dynamics of poverty, namely how people or households move in and out of poverty, a number of studies found mismatches between monetary and multidimensional non-monetary measures when using cross-sectional or panel data (Baulch and Masset 2003; Bradshaw and Finch 2003; Klasen 2000; Laderchi 1997; Roelen 2015; Santos et al. 2015; Sumarto and De Silva 2014; Tran et al. 2015; cited by Kim, 2019). In addition to these studies, a number of others showed a lack of association between the dynamics of monetary and multidimensional non-monetary measures (Baulch and Masset 2003; Gunther and Klasen 2009; Samman and Santos 2010; cited by Kim, 2019).

In this study, a multidimensional non-monetary measure was used in the form of a household asset score. The design of the non-monetary household asset score was guided by participatory wealth ranking exercises and the Morris Score Index (MSI). The participatory wealth ranking exercises were conducted in each year of the study in each of the study areas. This exercise informed the selection of specific livelihood capital assets that would be useful indicators of household wellbeing. Then during data analysis, following the Morris Score Index, the household asset score was constructed by weighing each livelihood characteristic variable by the share of households that report ownership of that asset in the sample (i.e. weighted by the popularity of each item). To measure the change in the asset score over the course of the study period, weights from the 2010 dataset were applied to 2011, 2012 and 2013 datasets, despite changes in ownership proportions of different assets (Table 5). The main assets considered in the compilation of the asset score include the quantity of land owned, number and type of livestock owned, type of dwelling roof and walls, and type of lighting and toilet. Although there was more extensive questioning around durable goods in 2011, 2012 and 2013 study rounds, as this data was not captured in 2010 these items could not be included in the variable as it would not have been comparable across all four study years.

Table 5: Household Asset Score Weights Applied to All Years Based on 2010 Ownership

	Weight Applied*
Land owned:	
3.0 + ha	8
2.5 - 3.0 ha	7
2.0 - 2.5 ha	6
1.5 - 2.0 ha	5
1.0 - 1.5 ha	4
0.5 - 1.0 ha	3
0.00 - 0.5 ha	2
0.00 ha	1
Dwelling Walls:	
Burnt bricks	2
Compacted Earth	1
Grass	1
Mudbrick (unfired)	1
Dwelling Roof:	
Iron sheets	2
Grass	1
Clay tiles	0
Plastic sheeting	0
Lighting Fuel:	
Electricity	3
Solar power	3
Battery Torch	2
Paraffin	2
Candles	2
Firewood	2
Grass	1
Nothing	0
Toilet:	
Traditional latrine with roof	1
Traditional latrine without a roof	0
None/Other	0
*Livestock: **	
Cattle	795
Oxen	800
Pig	134
Sheep	75
Goat	72
Chicken	8
Other Poultry	9

*Weights applied calculated by dividing the percentage of household who reported ownership divided by 100 **Livestock weight base on mean livestock value divided by 100.

The household asset score is used as both a continuous dependent variable and as a categorical variable to disaggregate the sample and investigate differences between households that fall into the lower and upper quartiles of the asset score range. With this, as the study is longitudinal in design, the data set allows for the investigation of whether poverty is long-term or short-term, and as included chapter 6, what proportion of the population were never poor, persistently poor, or intermittently poor over specific time periods.

Household Food Insecurity Access Scale (HFIAS)

The HFIAS is a commonly used indicator developed by USAID's Food and Nutrition Technical Assistance project (FANTA)[9] to assess household access to food. The scale allows for evaluation of food insecurity severity using questions that are categorised under three domains of the household food insecurity experience; anxiety and uncertainty about the household food supply, insufficient quality, as well as insufficient quantity of food intake and its physical consequences. (Gubert *et al.*, 2017). By capturing the household's own perception about their diet and food, access makes HFIAS a useful variable for capturing household's behavioural and psychological responses to food insecurity or perceived food insecurity (Mango *et al.*, 2018). The nine questions that fall under the three domains relate to experience from the past four weeks (i.e. one month recall period). Each of the nine questions is followed by a sub-question which determines the frequency of occurrence (i.e. rarely, sometimes, and often). The generic questions fall into three groups as outlined by Coates et al. (2007):

1. *Anxiety and uncertainty about the household food supply:*
    a. *Did you worry that your household would not have enough food?*
2. *Insufficient Quality (includes variety and preferences of the type of food):*
    a. *Were you or any household member not able to eat the kinds of food you preferred because of lack of resources?*
    b. *Did you or any household member have to eat a limited variety of foods due to the lack of resources?*
    c. *Did you or any household member have to eat foods that you really did not want to eat because of lack of resources to obtain other types of food?*
3. *Insufficient food intake and its physical consequences:*

[9] Established in 2005, FANTA is USAIDs flagship food security technical assistance project. https://www.fantaproject.org/about

a. *Did you or any household member have to eat fewer meals in a day because there was not enough food?*
b. *Was there ever no food to eat of any kind in your household because of lack of resources to get food?*
c. *Did you or any household member go to sleep at night hungry because there was not enough food?*
d. *Did you or any household member go a whole day and night without eating anything because there was not enough food?*

For each of the generic questions a score was applied: if the household said that the example given in the question did not occur in the past four weeks a score of 0 was applied, if it occurred rarely (i.e. once or twice in the past four weeks) a score of 1 was applied, for sometimes (i.e. three to ten times in the past four weeks) a score of 2 was applied, for often (i.e. more than ten times in the past four weeks) a score of 3 was applied. Using the sum of these weighted responses, the HFIAS can range from 0 and 27. The higher the score, the more food insecure the household was.

Household Diet Diversity Score (HDDS)

The Household Diet Diversity Score (HDDS) is a measure of dietary diversity: the higher the score, the more diverse the diet of the household members. Dietary diversity has gained recognition over the years as a good indicator for people's broader nutritional status, with more diverse diets being associated with positive nutritional trends (Sibhatu, Krishna and Qaim, 2015). From a development point of view, increasing dietary diversity is an important strategy for better nutrition and health outcomes. As a result, in the past decade, there has been an increase in the use of food group dietary diversity indicators to assess the impact of agriculture on food security and nutrition (Verger *et al.*, 2019). An advantage of dietary indicators is that they are more specific and sensitive to change in food availability and access, and require smaller more straight forward samples in comparison to anthropometric measures (Verger *et al.*, 2019).

For this study, the household level dietary diversity indicator was comparable to that used by the Malawian Central Statistical Office in their Integrated Household Survey III (IHS III). A recall period of 7 days was used, and a total of 113 food items are investigated by asking, *"In the past 7 days, have you or any household member eaten..."* Each of these 113 foods was then categorised into twelve food groups: cereals, roots, and tubers, vegetables, fruits, meat, eggs, fish, pulses, legumes and nuts, milk and milk products, oils and fats, sweets, spices, condiments and beverages (National Statistics Office, 2012). Using the sum of these weighted responses, the HDDs can range from 0 and 12; the higher the score, the more diverse the diet, thus indicating better nutritional status at the household level. For a detailed breakdown of the food groups employed see Annexe 3.

Limitations

This section gives details on some of the limitations experienced throughout the study period that should be noted and kept in mind throughout the thesis.

The first limitation relates to the generalisability of the data and findings. By design, the original research study focused on the farmers participating in the guaranteed groundnut purchasing scheme. Therefore, it is reasonable to assume that the data and findings can be generalised to other rural areas across Malawi's central region and to a lesser extent to similar agro-ecological and socio-economic settings in Malawi and elsewhere in Southern and East Africa. However, caution should be taken when extrapolating beyond this region considering the differences in the political economies. More comprehensive research, based on a larger sample size would be required for a more complete picture.

Another limitation, which was already referred to in the data collection overview, is related to the timing of the first round of data collection. This took place in April whereas the following three rounds took place in June/July. This hinders the comparability of seasonally sensitive variables such as the food security variables.

Both the questionnaire respondents and enumerators found the extensive questionnaire and sometimes lengthy recall periods challenging to answer and capture accurately. This was compounded by survey fatigue, low literacy levels, high expectations around comprehension and interpretation of specific units of measurement (e.g. kilograms and acres) and timeframes (e.g. past week, past month, past 12 months, last cropping season). Attempts to mitigate these challenges included: daily debriefs with enumerators, daily data review and cleaning, spot checks and one-on-one coaching during data collection by the supervisor.

The changing gender of household heads makes it difficult to look at significant change over time by gender (e.g. did female-headed households experience a significant change in their asset score over time). Also, by using the household as the unit of measurement, there are limitations in the depth of the findings around the inter-household gender dynamics. Without dedicated qualitative and quantitative questions that focus on either female or child members of the household, it is difficult to get a clear picture of what inequalities exist within households, what drives these inequalities, and what impact they have on livelihood outcomes like food security and access and control over resources.

Although somewhat outside the scope of the research questions, the study lacks the necessary qualitative data to examine, the prioritization of assets within a household's asset portfolio, the role of seasonality, the data that would help understand farmers objectives, perceptions of what is important to their livelihoods and whether their situation is improving or not. Some qualitative data was collected by the previous researchers in 2010 and 2011, however, it was not possible to incorporate it into this study. The author did conduct qualitative data collection in 2012 and 2013, however, the primary focus of this was around the production and marketing of groundnuts as a livelihood strategy. Qualitative data from 2012 and 2013 has been incorporated into the findings chapters as much as possible.

It is discussed extensively in the literature that when looking cumulatively at livelihood strategies of households, such as the study sample here, it is difficult to get a comprehensive and accurate picture of the real monetary income households to have. This is due to many factors, for example, a diverse range of income sources, difficulty in estimating non-monetary sources of income, seasonality, under/over-reporting by survey respondents, low literacy/numeracy skill levels and inappropriate recall periods. It is important to acknowledge that many of these challenges were faced throughout the study. However, attempts were made to overcome these limitations whilst maintaining comparability across the four study years.

Despite the extensive quantitative dataset, there are limitations around the use of just two food security indicators. The HFIAS and HDDS are widely used variables, however these only give a snapshot of access and availability of food in the last month and at the household level. Without data from other time points in the season, it is very difficult to gain insight into how food insecurity fluctuates within the year and how this impacts on livelihood choices. Likewise, by not including a food security variable that focused on individual household members that are likely to be more vulnerable to food insecurity (i.e. women, young children), the study is unable to explore inter-household food insecurity dynamics and inequalities.

When designing the household asset score design, data collected in the 2011, 2012, and 2013 had to be omitted. This data was from additional questions added to capture ownership of durable household goods (e.g. radio, bicycles, furniture). These data would have made the variable more sensitive to shifts between groups. However, this data was not collected in the 2010 paper-based questionnaire, therefore could not be included in the variable design.

Summary

The origins of this thesis date back to 2010, when the original research study was first conceived. The author of this thesis became involved in the research project in 2012 and 2013 and built on the work done by her predecessors.

An iterative mixed-method longitudinal approach was taken for this study. Data was collected on an annual basis in 2010, 2011, 2012 and 2013. The target population included approximately 3,000 smallholder farming households in three districts – Mchinji, Lilongwe and Salima. The study was designed in 2010 and was guided by the sustainable livelihoods framework.

The quantitative annual household questionnaire is the main source of data for the study. However, focus group discussions, semi-structured interviews and observations were conducted in the 2012 and 2013 rounds to supplement the quantitative dataset with qualitative data. The final sample size for the quantitative dataset was 195 households. Quantitative data analysis undertaken included: descriptive statistics, statistical tests for significance and correlation and regression analysis. Three quantitative dependant variables were used in the thesis: the household asset score, the HFIAS and the HDDS. Where relevant, the quantitative results are disaggregated by gender of household head and household asset score quartiles, the latter acting as a proxy for wealth groups. Thematic analysis was employed for the qualitative data from 2012 and 2013. The following chapters present the results from the analysis of these data and discuss the differences between groups and over time.

Chapter 5: Analysis of Livelihoods over Time

This chapter focuses on answering the first research question; *"What assets do households utilize to pursue their livelihood strategies? Does this differ by the gender of the household head?"* To answer this question, the human, natural and economic capital available to the studied population is analyzed and presented along with the main livelihood strategies employed by households. Shocks experienced by households and household decision making are presented to give an insight into the vulnerability and gender dynamics within households. Throughout the chapter, gendered differences between male-headed and female-headed households are presented. Changes over time are investigated by analyzing trends over the four study years.

Human Capital:

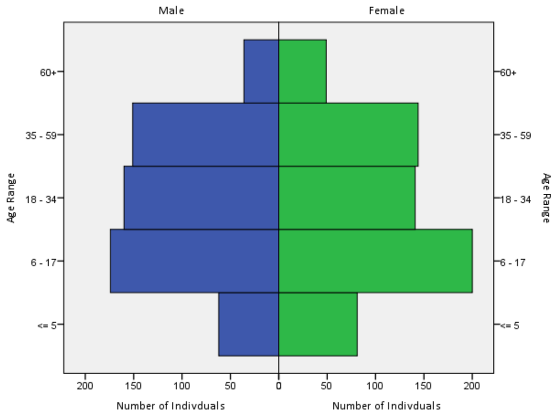
This section provides a descriptive analysis of the human capital available to the studied population. Scoones (1998) defined human capital as *"the skills, knowledge, ability to labour and good health and physical capability important for the successful pursuit of different livelihood strategies".* For this study, the human capital considered in the analysis includes household size, gender, age, dependency ratio, and health status of households. The study defined a household as a person or group of persons related or unrelated who live together and make common arrangements for food (i.e. eating from the same pot) (National Statistics Office, 2012).

Age and Sex Distribution

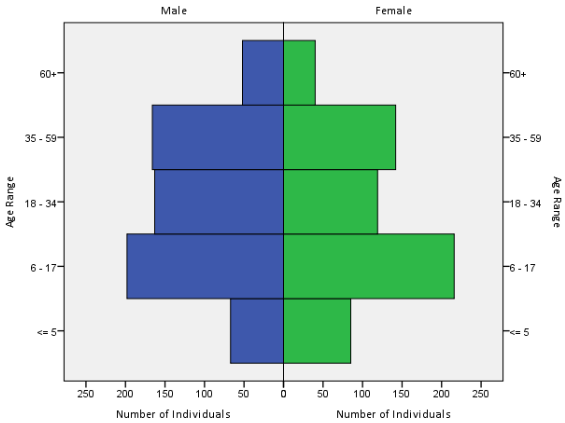
The population pyramid, derived from the household roster included in 2011, 2012, and 2013 questionnaires, shows some minor differences between genders by age group (Figure 8). There are two age groups that show a consistent decline in numbers over the three years; the youngest (under 5 years) and oldest (over 65) age cohorts.

Figure 8: Sample Population Pyramids 2011 – 2013

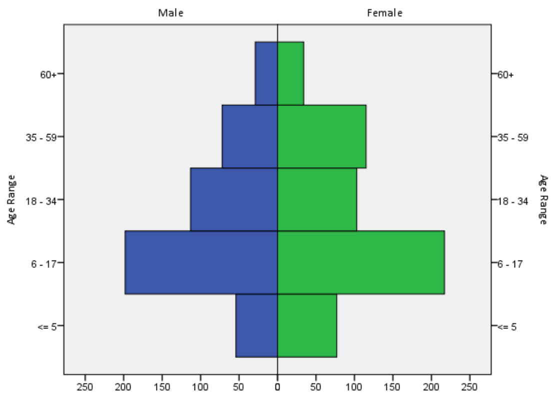
2011



2012



2013



Household Demographics

A household head is defined as the person who makes economic decisions in the household (National Statistics Office, 2012). The proportion of male versus female-headed households fluctuated significantly from year to year ranging from 35 per cent female-headed households in 2010 to 41 per cent in 2013 (Cochran's Q Test; p=0.000). The data leads us to believe that the household head role can change repeatedly within and between years, depending on co-habiting arrangements, which are of a polygamous nature in the studied area.

There was a statistically significant decline in the mean household size from 5.7 members in 2010 to 5.2 members in 2013 (Paired samples t-test; p=0.001). For each study round, male-headed households had a statistically significantly larger mean household size in comparison to female-headed households (2010 p=0.001; 2011 p=0.004; 2012 p=0.003, 2013 p=0.000) Table 6.

A dependency ratio variable was calculated for each study round. This variable can be defined as the ratio between the total number of persons in the household and the total number of persons outside the economically active age (i.e. children under the age of 15 years and adults over the age of 65 years). This gives an insight into the proportion of dependents in the household. The dependency ratio is available for three of the four study rounds as a full detailed household roster was included in all questionnaire rounds, bar the 2010 round.

The mean dependency ratio in 2013 was 1.1, implying that, in the average household, there are 0.1 more economically inactive persons for every economically active person. This significantly increased (i.e. got worse) between the three study rounds (One-way repeated measures ANOVA; p=0.000047). Female-headed households had a significantly larger dependency ratio than male-headed households in 2012 and 2013 (Independent samples t-test: 2012 p=0.048; 2013 p=0.048). Showing that female-headed households have less economically active household members in comparison to male-headed households, this difference appears to be getting worse with time (Table 6).

There was a statistically significant reduction in the mean number of years of education obtained by household heads, which ranged from 5.2 in 2011 to 4.7 in 2013 (One-way repeated measures ANOVA; p=0.029254). This change is likely due to the fluid nature of the household head role mentioned early on in this section. However, it can be said that there is both a statistically and practically significant difference between the mean number of years' education reported by female-headed households versus male-headed households (Independent samples t-test; 2011 p=0.000; 2012 p=0.000; 2013 p=0.000).

Table 6: Sampled Households' Key Demographics

		2010	2011	2012	2013
Gender of Household Head	MHH	65%	67%	73%	59%
	FHH	35%	33%	27%	41%
Mean Household Size	MHH	6.1	5.4	5.7	5.7
	FHH	5.0	4.7	4.8	4.6
	Overall	5.7	5.1	5.4	5.2
Mean Household Dependency Ratio	MHH	-	0.8	0.8	1.1
	FHH	-	1.0	1.2	1.3
	Overall	-	0.8	0.9	1.1
Mean Number of Years Education for HH Head	MHH	-	6.1	5.6	5.9
	FHH	-	3.3	3.4	2.9
	Overall	-	5.2	5.0	4.7

*** significant at 1%, ** significant at 5%, * significant at 10%

Health Status

The proportion of households reporting having experienced illness in the past month declined from 82.1 per cent in 2010 to 59.5 per cent in 2013. However, the mean number of household members reporting illness remained largely unchanged from 1.5 in 2010 to 1.4 in 2013, with little variance in in-between years (Table 7).

Table 7: Percentage of households and the mean number of household members reporting illness

		2010	2011	2012	2013
% of households reporting an illness	MHH	82.5%	76.2%	83.2%	57.8%
	FHH	81.2%	72.3%	82.7%	62.0%
	Overall	82.1%	74.9%	83.1%	59.5%
Mean number of household members reporting illness	MHH	1.5	1.4	1.5	1.5
	FHH	1.5	1.5	1.4	1.4
	Overall	1.5	1.4	1.5	1.4

An illness score was calculated for each household for four years. This represents the sum of the number of days household members were unable to perform their regular duties/tasks divided by the number of household members, resulting in an average household illness score (i.e. days missed due to illness per capita). The mean illness scores over the four years are presented in Table 8. The overall mean score ranged from the lowest value of 1.03 in 2010 to the highest value of 1.33 in 2012; there was no statistically significant change in the overall mean illness score over time. Female-headed households had a significantly worse mean illness score in comparison to male-headed households, in 2012 and 2013 (Independent samples t-test; 2012 p=0.039; 2013 p=0.012).

Table 8: Mean Illness Score and Number of Days Labour Missed Due to Illness

	2010	2011	2012	2013
MHH	0.90	0.77	1.18	1.01
FHH	1.26	1.21	1.72	1.51
Overall	1.03	0.91	1.33	1.14

*** significant at 1%, ** significant at 5%, * significant at 10%

Table 9 shows the main types of illnesses experienced by household members in the past month. For each study round, malaria was always the most prevalent illness reported. The prevalence of malaria peaked in 2012 when 149 cases were reported; 44.96 per cent of these were in Salima. The lakeshore district Salima is one of the districts in Malawi, where the prevalence rate of malaria is at its highest (Kazembe et al., 2006). However, for this year, during data collection and follow-up investigations in 2013, study participants spoke of a spike in the occurrence of malaria in 2012. This was confirmed in key informant interviews and focus group discussions. It was also reported that this type of malaria was proving more severe than usual and was making people extremely sick.

Although the overall trend among the studied households shows that the prevalence of malaria declined from 61 per cent in 2010 to 38 per cent in 2013, the prevalence of upper respiratory illnesses increased from 14 per cent in 2010 to 29 per cent in 2013.

Table 9: Illnesses Experienced in the Past Month

		2010	2011	2012	2013
Fever/Malaria	MHH	63%	61.5%	82.2%	41.4%
	FHH	57%	44.6%	65.4%	34.2%
	Overall	61%	56%	76.4%	38%
Lower respiratory illness	MHH	3%	0%	3.5%	2.6%
	FHH	1%	0%	7.7%	3.8%
	Overall	3%	0%	4.6%	3%
Upper respiratory illness	MHH	13%	8.5%	24.8%	23.3%
	FHH	16%	9.2%	13.5%	38.0%
	Overall	14%	9%	20.5%	29%
Stomach illness (ache/vomiting/diarrhoea)	MHH	17%	7.7%	13.8%	7.8%
	FHH	16%	15.4%	9.6%	7.6%
	Overall	16%	10%	11.8%	8%
Other	MHH	3%	27.7%	11.9%	10.3%
	FHH	7%	36.9%	13.5%	3.8%
	Overall	5%	31%	11.3%	8%

The main action taken to treat illnesses was to visit a medical facility. Over the four years, the proportion of reported illnesses that led to a visit to a medical facility ranged between 80 per cent in 2010 to 77 per cent in 2013 Table 10. The second most common action was the purchasing of drugs from a chemist or grocery store, which ranged between 15 per cent in 2010 to 18 per cent in 2013. There was little difference between male-headed and female-headed households.

It was established from focus group discussions that it was common practice to visit a medical facility for illnesses. Such medical facilities are provided by Malawi's Ministry of Health and are free of charge. However, the cost of transportation to these facilities is seen as a considerable burden on households. Many stated how a visit to a health centre would have to be paid for by selling small livestock (e.g. poultry) or borrowing from relatives and neighbours if either is possible. However, medical centres in Malawi often don't have the necessary medication available, causing patients to go and buy drugs with a prescription, something that is not affordable for many households.

Table 10: Actions Taken by Households Who Reported Experiencing an Illness in the Past Month

		2010	2011	2012	2013
Nothing no money	MHH	1%	1%	0%	0%
	FHH	1%	3%	2%	6%
	Overall	1%	2%	0%	2%
Nothing wasn't serious	MHH	2%	1%	0%	2%
	FHH	4%	0%	5%	1%
	Overall	3%	0%	1%	2%
Purchased drugs	MHH	15%	18%	14%	15%
	FHH	15%	26%	25%	23%
	Overall	15%	20%	16%	18%
Traditional healer	MHH	0%	0%	0%	1%
	FHH	0%	0%	2%	0%
	Overall	0%	0%	0%	1%
Visited a medical facility	MHH	82%	77%	83%	95%
	FHH	76%	68%	75%	67%
	Overall	80%	74%	81%	77%
Used own remedy	MHH	0%	0%	0%	0%
	FHH	1%	3%	0%	0%
	Overall	1%	1%	0%	0%

Natural Capital:

This section presents the analysis of the natural capital available to the studied population. Scoones (1998) defined natural capital as "...*the natural resource stocks (soil, water, air, genetic resources etc.) and environmental services (hydrological cycle, pollution sinks etc.) from which resource flows and services useful for livelihoods*". For this study land ownership and cultivation, and access to water and sanitation, are considered as the main forms of natural capital employed by households.

Land Ownership & Cultivation

The mean land ownership over the four years ranged between 1.21ha in 2010 and 1.12ha in 2013 as shown in Table 11; there was no statistically different change in mean land ownership over time (One-way repeated measures ANOVA; p=0.274). In all study rounds, apart from 2010, female-headed households owned a significantly lower area of land (Independent-samples t-test; 2010 p=0.470, 2011=0.006, 2012=0.033, 2013 p=0.047).

Table 11 also shows the mean area of land cultivated in the previous rain-fed season, which was 1.13ha in 2010 and declined to 1.02 in 2013. This decline over time was not statistically significant (One-way repeated measures ANOVA; p=0.121). Like mean land ownership, in all study rounds, apart from 2010, results showed that female-headed households cultivated significantly less land than male-headed households (Independent-samples t-test; 2010 p=0.485, 2011=0.000, 2012=0.004, 2013 p=0.022).

Table 11: Land Ownership in Hectares (ha)

		2010	2011	2012	2013
Mean Land Ownership (ha)	MHH	1.26	1.30	1.25	1.21
	FHH	1.13	0.97	1.00	0.99
	Overall	1.21	1.19	1.19	1.12
Mean Land Cultivation (ha)	MHH	1.17	1.18	1.16	1.10
	FHH	1.07	0.80	0.87	0.88
	Overall	1.13	1.06	1.08	1.02

*** significant at 1%, ** significant at 5%, * significant at 10%

The occurrence of land rentals decreased over the study period. The percentage of households who rented out the land for others to cultivate went from 13 per cent in

2010 to 7 per cent in 2013. Meanwhile, land rented in by households for their own cultivation went from 30 per cent in 2010 to 13 per cent in 2013 (Table 12).

Table 12: % of Households Renting Out and In Land

		2010	2011	2012	2013
% of households who rented out land for others to use	MHH	14%	13%	9%	8%
	FHH	20%	11%	4%	5%
	Overall	16%	12%	8%	7%
% of households rented in the land for their own use	MHH	29%	28%	27%	16%
	FHH	33%	20%	8%	10%
	Overall	30%	25%	22%	13%

Despite the overall decline in the prevalence of households either renting out or renting in the land, the mean amount of land remained stable. The mean area of land rented out was 0.68ha during the first and last study rounds, with little fluctuation in-between years (Table 13). There was also no statistically significant difference in the amount of land rented out by male-headed households in comparison to female-headed households (Independent-samples t-test; 2010 p=0.077; 2011 p=0.720; 2012 p=0.332; 2013 p=0.264).

The same stable trend emerged for the area of land rented in by households; no statistically significant change over time and no difference between female-headed and male-headed households (Independent-samples t-test; 2010 p=0.449; 2011 p=0.461; 2012 p=0.871; 2013 p=0.784).

Table 13: Mean Area of Land in Hectares Rented Out and In

		2010	2011	2012	2013
Mean number of hectares rented out by households for others to use	MHH	0.84	0.65	0.58	0.55
	FHH	0.47	0.58	0.30	0.96
	Overall	0.68	0.63	0.55	0.68
Mean number of hectares rented in by households for own use	MHH	0.74	0.63	0.67	0.47
	FHH	0.61	0.51	0.71	0.51
	Overall	0.69	0.60	0.67	0.48

Although there appears to be an upward trend in the mean amount paid per hectare of land rented in and out (Table 14), it is not possible to test this change over time as the subsample consistently reporting renting each year is too small (e.g. 13 households renting out and 26 households renting in land in 2013).

Table 14: Mean Amount Paid/Received per Hectare of Land Rented (MWK/ha)

		2010	2011	2012	2013
Mean rent received from land rented out to other households (MWK)	MHH	5,718	8,746	7,249	9,175
	FHH	6,823	6,516	5,925	7,863
	Overall	6,297	8,188	7,155	8,771
Mean rent paid by households renting land for their own use (MWK)	MHH	7,816	8,966	8,091	8,569
	FHH	7,702	10,919	8,104	8,490
	Overall	7,773	9,433	8,092	8,545

* Real values reported here using CPI re-indexed to the 2010 nominal value

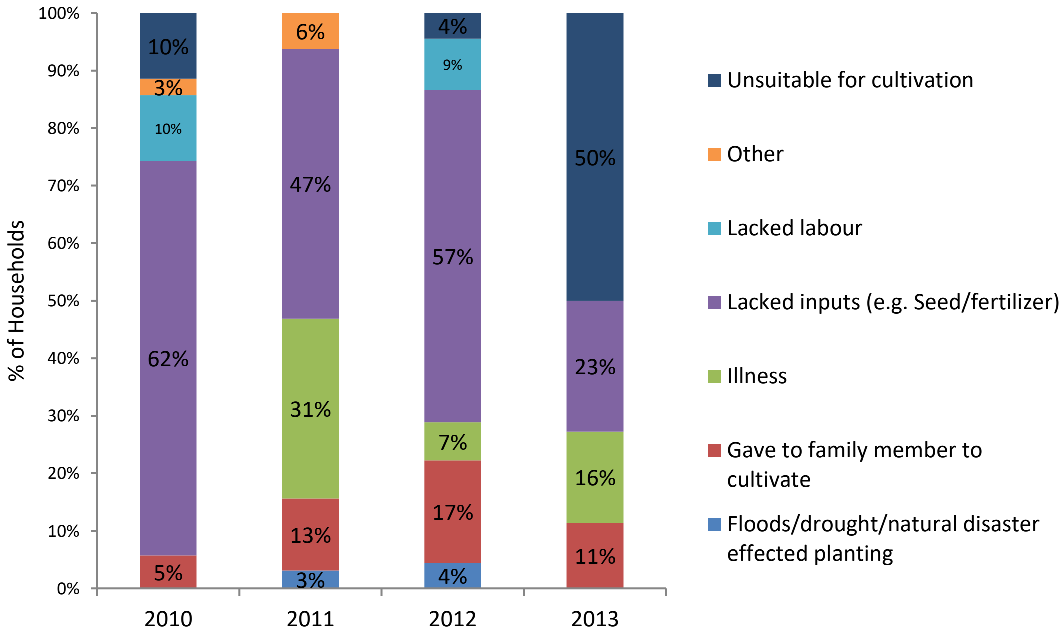
The proportion of households leaving land uncultivated remained stable over the study period ranging from 20 per cent in 2010 to 23 per cent in 2013. There were similar proportions across male-headed and female-headed households. However, the mean area left uncultivated did fluctuate from the lowest amount of 1.25 hectares in 2010 to the lowest amount in 2011 of 0.48 hectares (Table 15). There were no significant differences in the amount of land left uncultivated when comparing male-headed and female-headed households (Independent-samples t-test: 2010 p=0.281; 2011 p=0.153; 2012 p=0.280; 2013 p=0.829).

Table 15: Percentage of Households and Mean Area of Land Reported Leaving Land Uncultivated

		2010	2011	2012	2013
% of households who reported leaving land uncultivated	MHH	21%	15%	22%	22%
	FHH	17%	20%	27%	23%
	Overall	20%	16%	24%	23%
Mean area of land reported uncultivated (ha)	MHH	1.53	0.55	1.42	0.44
	FHH	0.64	0.36	0.61	0.48
	Overall	1.25	0.48	1.17	0.46

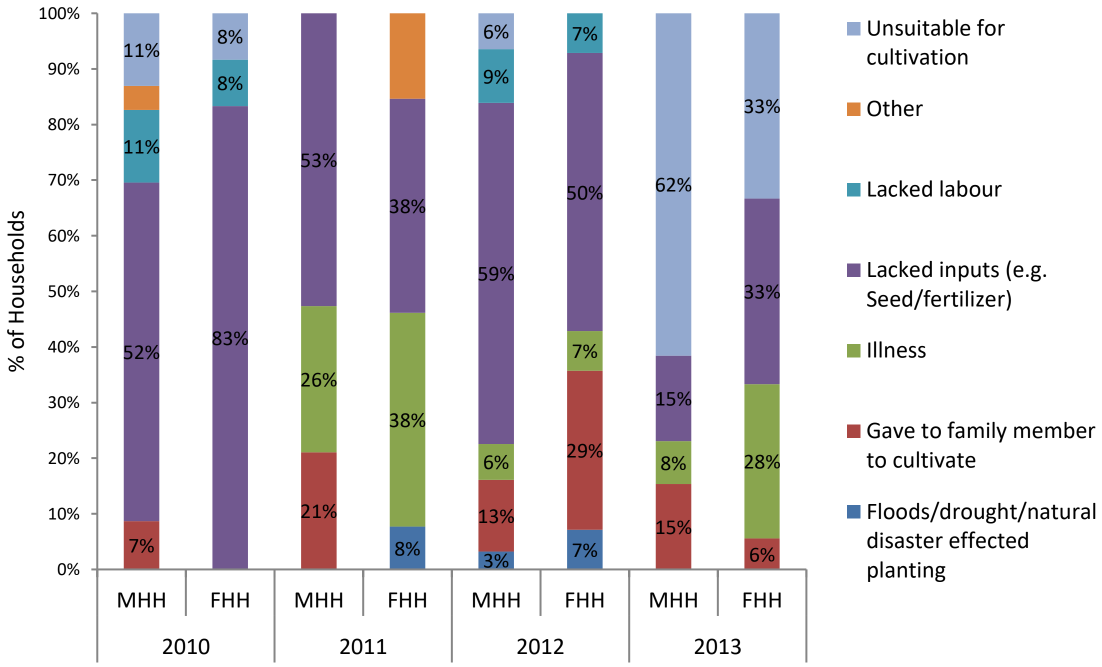
The main reasons attributed to leaving land uncultivated over the four study years are shown in Figure 9. In the first three rounds, the main reason for leaving land uncultivated was lack of inputs (e.g. seed and fertiliser) ranging from 62 per cent in 2010 to 57 per cent in 2012, this reduced considerably to 23 per cent in 2013. In 2013, the main reason changed to the suitability of land for cultivation, which increased from 10 per cent in 2010 to 50 per cent in 2013.

Figure 9: Reason Attributed to Leaving Land Uncultivated by Household



There were some considerable differences in the main reasons attributed to leaving land uncultivated when comparing male-headed and female-headed households (Figure 10). As the overall trend, lack of inputs was the main reason for both male-headed and female-headed households in 2010, 2011 and 2012, with the illness also being one of the most common reasons for female-headed households in 2011 (38 per cent). In 2013, land suitability did become the most common reason for both male (62 per cent), and female (33 per cent) headed households. For female-headed households, lack of inputs remained as a common barrier (33 per cent) in comparison to male-headed households (15 per cent).

Figure 10: Reason Attributed to Leaving Land Uncultivated by Gender of Household Head



Access to Water & Sanitation

A household is considered to have access to safe drinking water if their source of water is; piped into the dwelling/yard/plot, a communal standpipe, a protected well in their yard or plot, or a protected public well or borehole (National Statistical Office, 2012). The proportion of the overall sample accessing drinking water from an unsafe or unprotected source decreased from 60 per cent in 2010 to 7 per cent in 2013. This definite decrease is driven mainly by the increased access to protected wells and hand pumps, which more than doubled from 40 per cent in 2010 to 88 per cent in 2013 (Figure 11). In 2013, 96 per cent of households reported using this source all year round, this figure varied marginally from 2010, with the lowest prevalence of all-year-round use being in 2012 (93 per cent of households).

Figure 11: Main Type of Water Source Accessed by Households in the Past Month

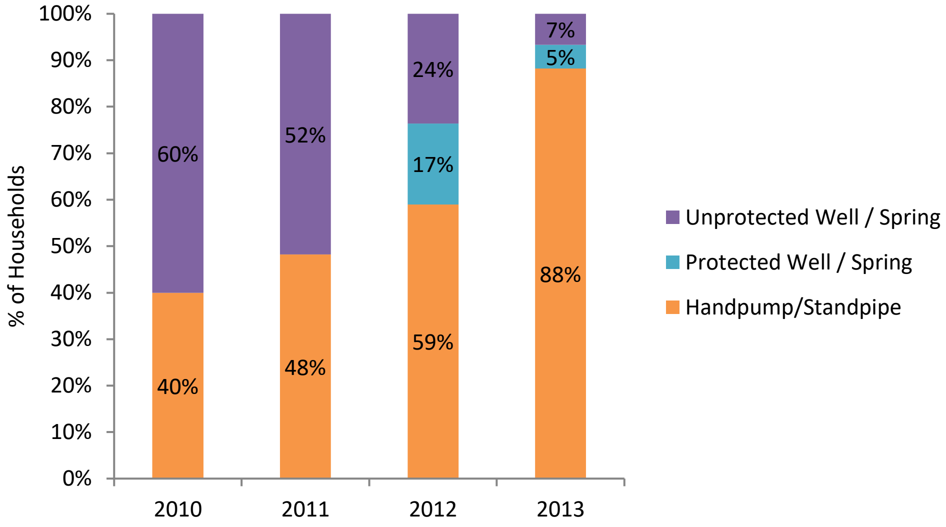
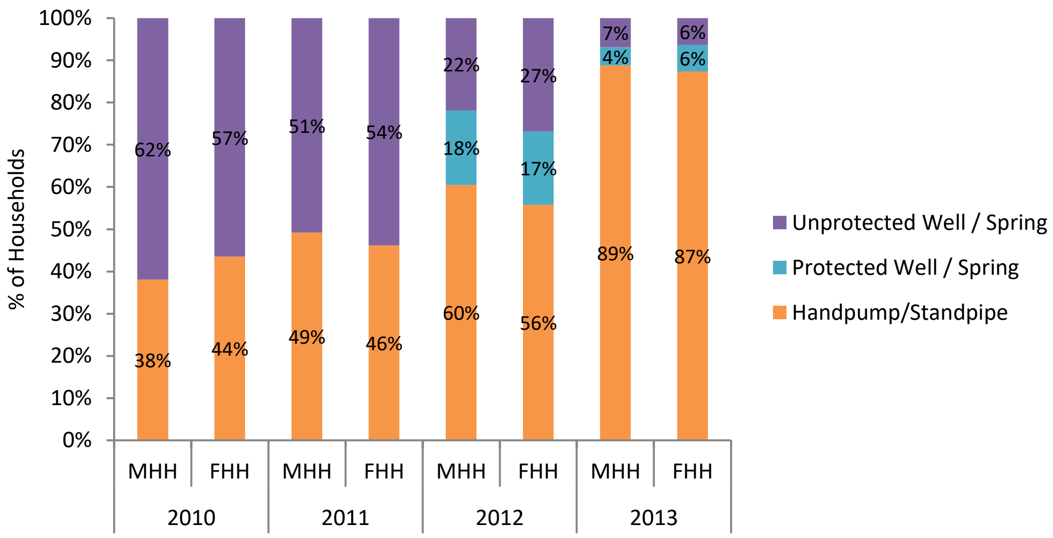


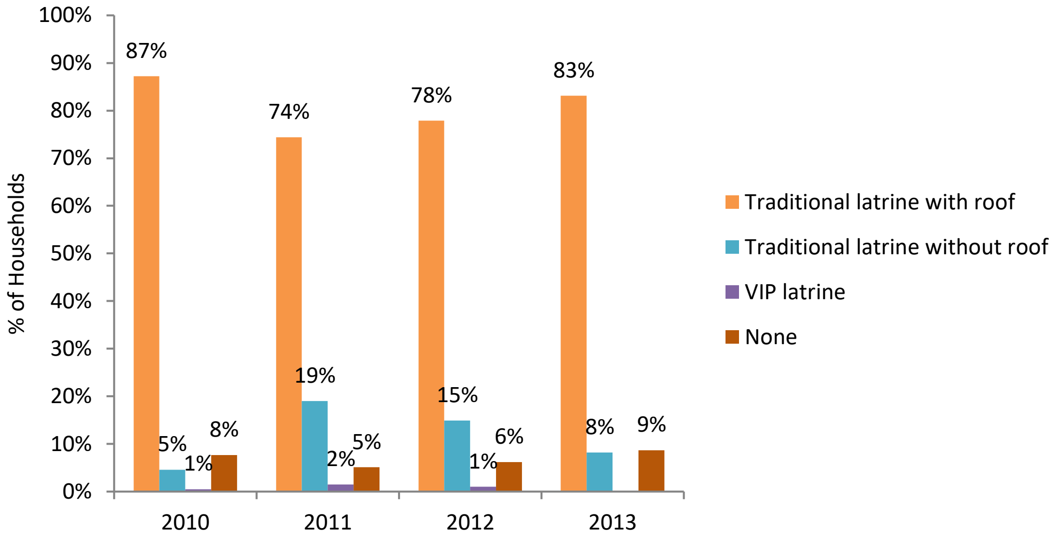
Figure 12 shows that the overall trend is mirrored for both male-headed and female-headed households with little difference between the two groups over the years (Chi-square test for independence: 2010 p=0.561, 2011 p=0.800, 2012 p=0.638, 2013 p=1.000).

Figure 12: Main Type of Water Source Accessed by Households in the Past Month



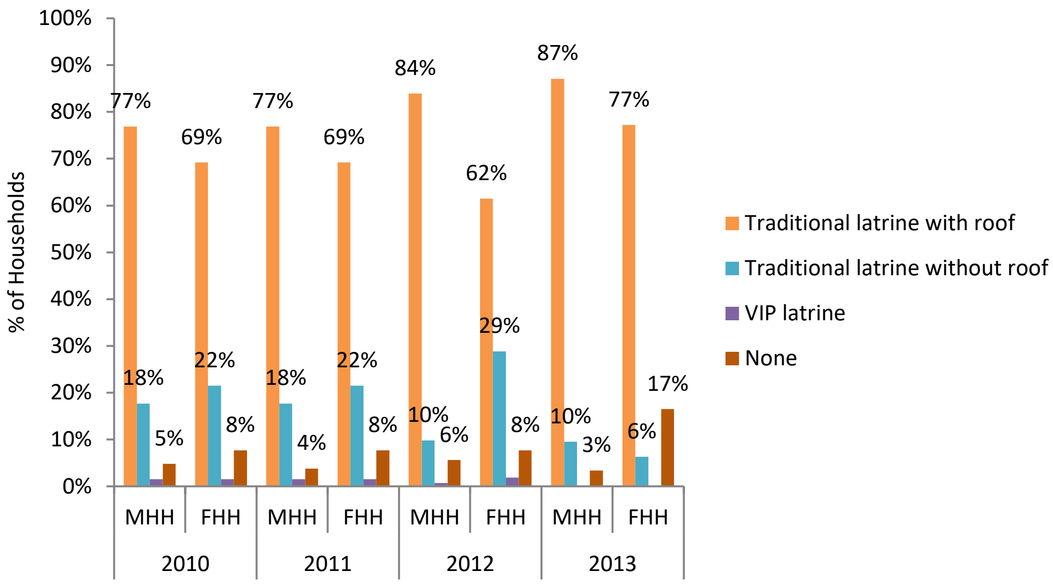
Access to proper sanitation is determined when households have a flush toilet, VIP latrine or traditional latrine with a roof. For all years there is a high proportion of households with access to proper sanitation. The most popular type of sanitation was the traditional latrine with roof, very few households reported using a VIP latrine, 2 per cent in 2011 (Figure 13). The percentage of households with a traditional latrine remained relatively stable, going from 87 per cent in 2010, to 74 per cent in 2011 and 78 per cent in 2012, back to 83 per cent in 2013. The minor declines in 2011 and 2012 are likely due to the need to rebuild full latrines. These results are slightly higher than the 74 per cent of households reported for the 'rural central' regional sample from the 2010-2011 Integrated Household Survey.

Figure 13: Type of Latrine Used by Households



There was only one year, 2012, where there was a significant difference in the access to proper sanitation between male-headed and female-headed households; 83.9 per cent of male-headed households had access to proper sanitation, in comparison to 61.5 per cent of female-headed households (Figure 14) (Chi-square test; 2010 p=0.770, 2011 p=0.324, 2012 p=0.002, 2013 p=0.108).

Figure 14: Type of Latrine Used by Households by Gender of Household Head



Economic Capital:

Scoones (1998) defined economic or financial capital as *"the capital base (cash, credit/debt, savings, and other economic assets, including basic infrastructure and production equipment and technologies) which are essential for the pursuit of any livelihood strategy".* For this study, livestock ownership, and household access to savings and credit were considered as economic capital. Livestock sales are also included in this section, which can be considered as a livelihood strategy.

Livestock Ownership & Sales

In Malawi, livestock ownership is commonly perceived as a sign of wealth. In times of stress, animals can be sold or killed to respond to shocks experienced by the household; this makes livestock a relatively liquid asset. The example of a chicken being sold to cover transport costs when a household member falls ill was repeatedly mentioned by women in focus group discussions. Seasonality influences supply and demand of livestock, with prices, often double in the lean months as opposed to post-harvest months. Chicken, goat, pig, and cattle are the most common types of livestock kept in the study area. There were also small numbers of duck, guinea fowl and donkeys reported.

The percentage of households not owning any livestock was at its highest in 2010 with 30.8 per cent of households, and at its lowest in 2012 with 21.0 per cent of households (Table 16). In 2011, 38.5 per cent of female-headed households reported having no livestock at all; this was significantly more in comparison to male-headed households, 23.8 per cent. For all other years, there were differences between the percentage of male-headed and female-headed households owning no livestock, but these were not statistically significant (Chi-square test for independence: 2010 p=1.000, 2011 p=0.050, 2012 p=0.156, 2013 p=0.118).

The preference in the types of livestock owned remained consistent over the four years with chickens always being the most popular, followed by goat, pig, and cattle. There was a consistent annual increase in the percentage of households reporting ownership of chickens, increasing from 48.2 per cent in 2010 to 61.0 per cent in 2013, although not significantly (McNemar's test; p=0.107) (Table 16). Similarly, the prevalence of pig ownership also grew consistently from a low base in 2010, 8.2 per cent to 17.4 per cent in 2013, which was significant (McNemar's test; p=0.014). The percentage of households that owned goats and cattle remained largely the same over the four years, with 41.5 per cent owning goats in 2010 and 39.5 per cent in 2013 (McNemar's test; p=0.302). For cattle, 4.6 per cent owned cattle in 2010 and 6.2 per cent in 2013 (McNemar's test; p=0.344).

Although there are many gender differences in types of livestock owned, there are only three instances where these differences were statistically significant. The first instance was in 2011, when 50.8 per cent of male-headed households reported owning chickens in comparison to 33.8 per cent of female-headed households (Chi-square test for independence, p=0.037). The second instance, again in 2011, when 20.8 per cent of male-headed households reported owning pigs in comparison to 3.1 per cent of female-headed households (Chi-square test for independence, p=0.002) (Table 16). The third and final instance was, in 2013, when 46 per cent of male-headed households reported owning pig in comparison to 30 per cent of female-headed households (Chi-square test for independence, p=0.028).

Table 16: Ownership of Livestock by Type

		2010	2011	2012	2013
Chicken	MHH	48.4%	50.8%	69.2%	64%
	FHH	47.8%	33.8%	55.8%	57%
	Overall	48.2%	45.1%	65.6%	61.0%
Goat	MHH	40.5%	47.7%	42.7%	46%
	FHH	43.5%	35.4%	42%	30%
	Overall	41.5%	43.6%	42.6%	39.5%
Pig	MHH	8.7%	20.8%	21.0%	21%
	FHH	7.2%	3.1%	13%	13%
	Overall	8.2%	15.0%	19.0%	17.4%
Cattle	MHH	4.8%	5.4%	7.7%	9.5%
	FHH	4.3%	0.0%	1.9%	1.3%
	Overall	4.6%	3.6%	6.2%	6.2%
No livestock	MHH	31.0%	23.8%	18.2%	20.7%
	FHH	30.4%	38.5%	28.8%	31.6%
	Overall	30.8%	28.7%	21.0%	25.1%

*** significant at 1%, ** significant at 5%, * significant at 10%

While the proportion of households owning chickens increased from 48.2 per cent in 2010 to 61.0 per cent in 2013, the mean number owned decreased from 9.46 to 7.56, although not significantly (Paired samples t-test; p=0.349) (Table 17). Likewise, there was an increase in the proportion of households reporting pig ownership, but the mean number of pigs owned remained stable ranging from 4.93 in 2010 to 4.09 in 2013 (Paired samples t-test; p=0.114). In 2010, pigs were the only type of livestock to show a difference in the number owned by a female-headed household (7.80), in comparison to male-headed households (3.91), this difference was statistically significant (Independent samples t-test; p=0.000). Regarding goats and cattle, there was no significant change over time or differences between male-headed and female-headed households (Table 17).

Table 17: Mean Number of Livestock Owned by Households

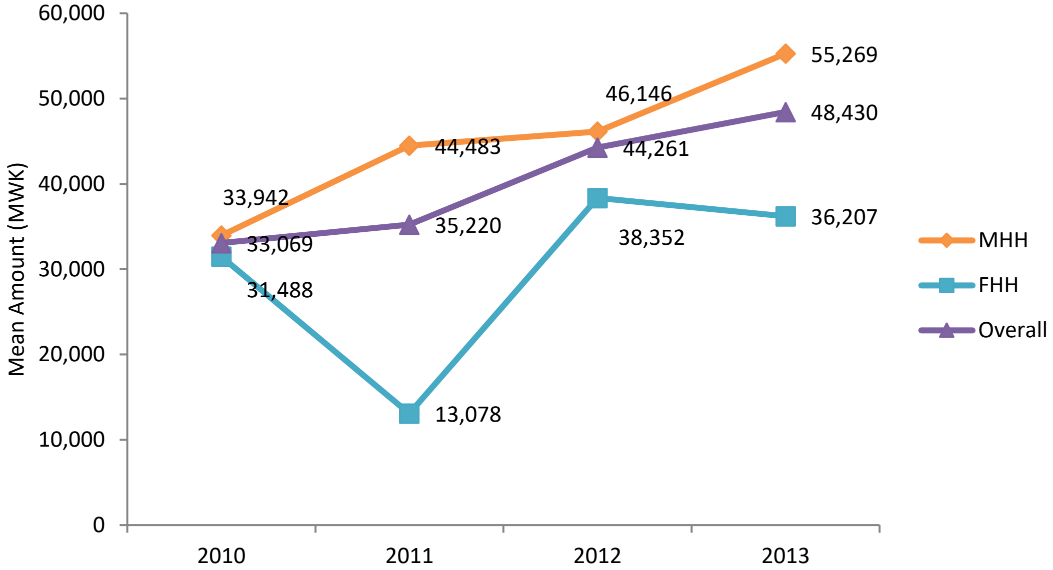
		2010	2011	2012	2013
	MHH	10.41	9.65	10.36	8.24
Chicken	FHH	7.70	8.68	7.48	6.44
	Overall	9.46	9.41	9.71	7.56
	MHH	5.45	4.23	4.67	3.98
Goat	FHH	4.03	3.65	5.32	4.33
	Overall	4.93	4.07	4.84	4.09
	MHH	3.91	-	3.70	2.50
Pig	FHH	7.80	-	4.00	3.20
	Overall	5.13	-	3.76	2.71
	MHH	1.67	4.00	2.18	2.00
Cattle	FHH	2.33	0.00	2.00	1.00
	Overall	1.89	4.00	2.17	1.92

*** significant at 1%, ** significant at 5%, * significant at 10%

The monetary value of livestock owned by households over the study period is shown in Figure 15, with the mean earnings from livestock sales shown in Figure 16, both include results disaggregated by gender of the household head.

Although it appears that there was a substantial increase in the mean value of livestock owned from 2010 (33,942 MWK) to 2013 (55,269 MWK) this steady increase was not statistically significant (Paired samples t-test; p=0.286). In 2011, male-headed households had a statistically significant higher mean value (44,483 MWK) in comparison to female-headed households (13,078 MWK) (Independent samples t-test; 2010 p=0.816; 2011 p=0.017; 2012 p=0.569; 2013 p=0.210).

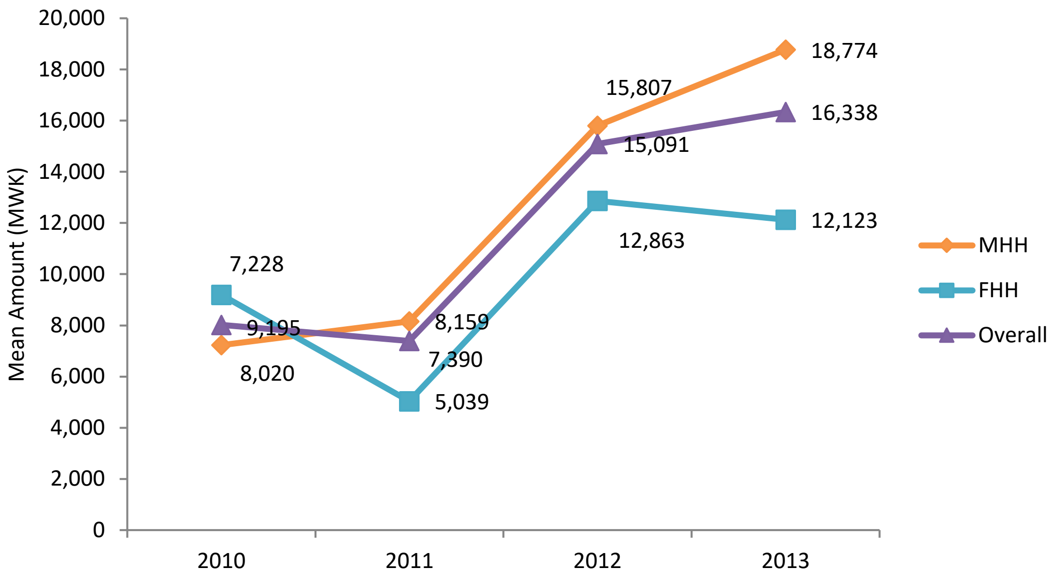
Figure 15: Mean Value of Livestock Owned by Households (MWK)[10]



The income gained from livestock sales appears to have increased substantially with mean values increasing steadily from 9,195 MWK in 2010 to 16,338 MWK in 2013, although this increase was not statistically significant (Paired samples t-test; p=0.132) (Figure 16). Year on year, female-headed households earn less than male-headed households from livestock sales, however, at no point was this statistically significant (Independent samples t-test; 2010 p=0.383; 2011 p=0.133; 2012 p=0.617; p=0.198) (Figure 16).

10 Nominal values were converted to real values using the CPI with 2010 value as the base index.

Figure 16: Mean Income Reported from the Sale of Livestock by Households in the Last 12 months



Access to Saving & Credit

Household access to savings grew almost three-fold over the study period, increasing from 15.1 per cent in 2010 to 46.2 per cent in 2013, this change was statistically significant (McNemar's test; p=0.000) (Figure 17). In 2010, 15.1 per cent of male-headed households and 4.3 per cent of female-headed households had savings. This increased for both in 2013 with 46.6 per cent of male-headed households and 34.2 per cent of female-headed households. These difference between the two types of households was statistically significant in both years (Chi-square test; 2010 p=0.0043; 2012 p=1.000; 2013 p=0.020) (Figure 17).

In contrast to the percentage of households accessing savings, there was no significant change in the percentage of households accessing credit with 32.8 per cent reporting in 2010 and 40.0 per cent in 2013 (McNemar's test; p=0.093) (Figure 18). Similarly, there were no significant differences in the percentage of male-headed households accessing credit in comparison to female-headed households (Chi-square test; 2010 p=0.715; 2011 p=0.953; 2012 p=0.727; 2013 p=0.787) (Figure 18).

Figure 17: Percentage of Households with Savings

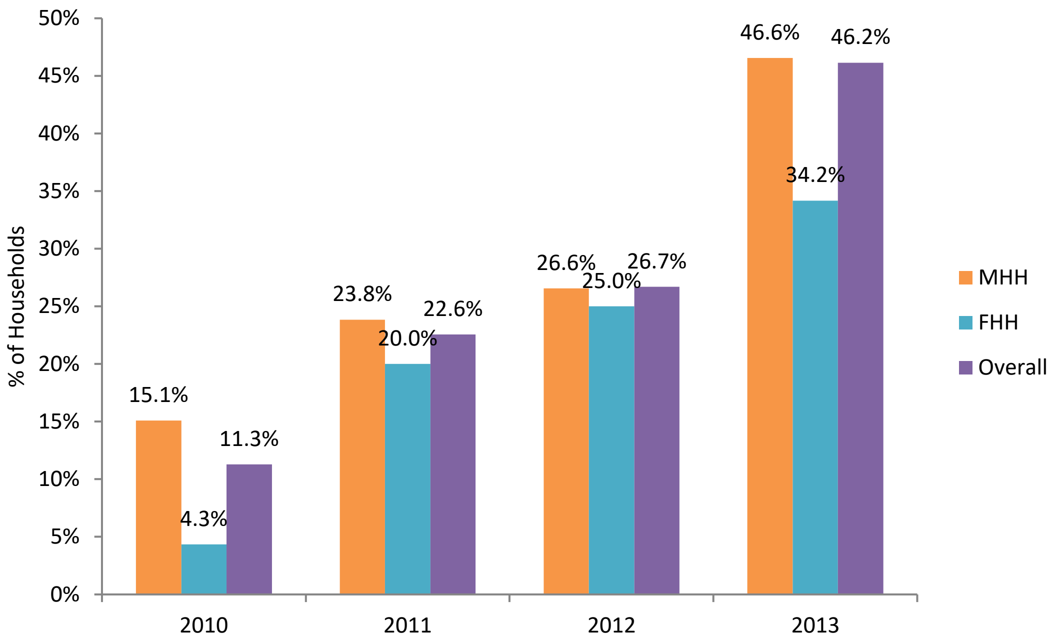
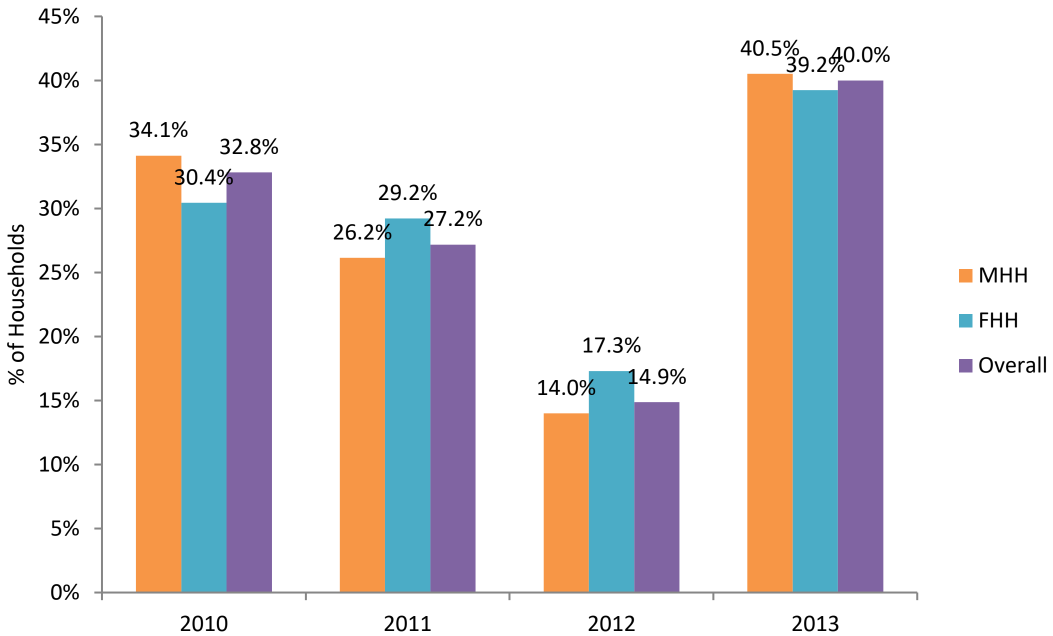


Figure 18: Percentage of Households with Access to Credit



The increase in the percentage of households accessing savings can be linked to the emergence of the 'Village Savings and Loans' groups (VSLs). In 2013 68 per cent of savings were kept in VSLs (Figure 19). During focus group discussions in 2013 participants referred to the appointment of the first female president Joyce Banda and her political party who encouraged people, especially women, to set up their own village savings and loans groups. Discussions around this topic often included how it was now popular for women to start up their own small business. This correlates with the difference in the proportion of female-headed households reporting using VSLs in comparison to male-headed households. In 2012, 64 per cent of female-headed households used VSL groups in comparison to 39 per cent of male-headed households. In 2013 the difference continued, 86 per cent of female-headed households used VSLs in comparison to 60 per cent of male-headed households (Figure 20).

Other common places to have savings were commercial banks and at home. The popularity of both as a location for savings decreased considerably over the study period in contrast to the growth of VSLs (Figure 19).

Figure 19: Location of Savings

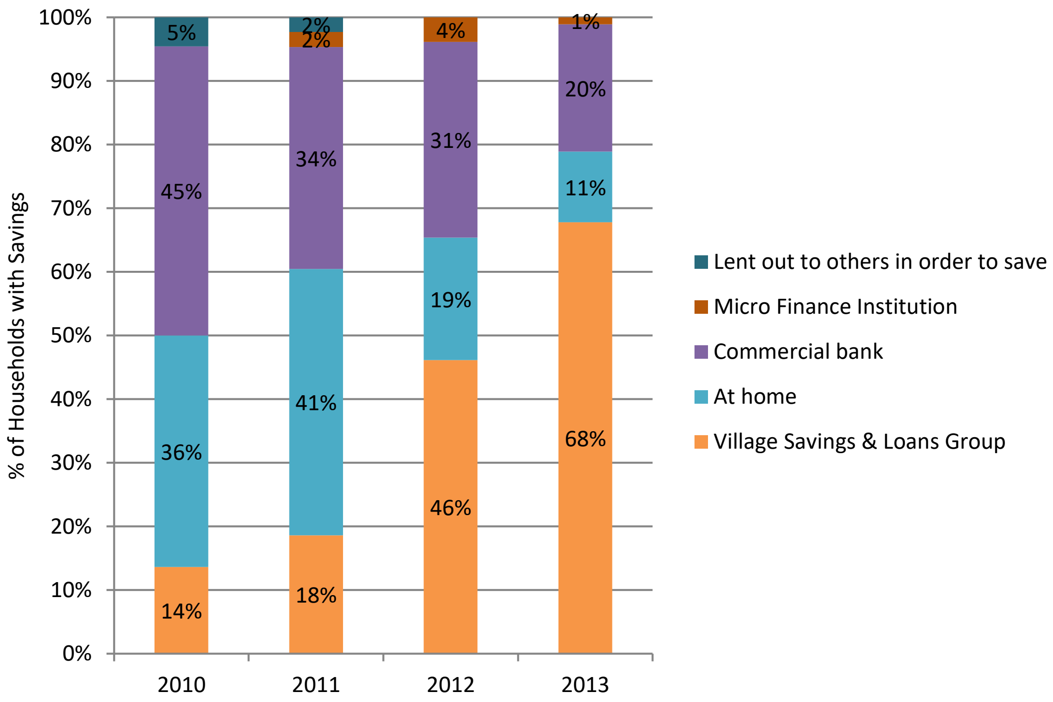
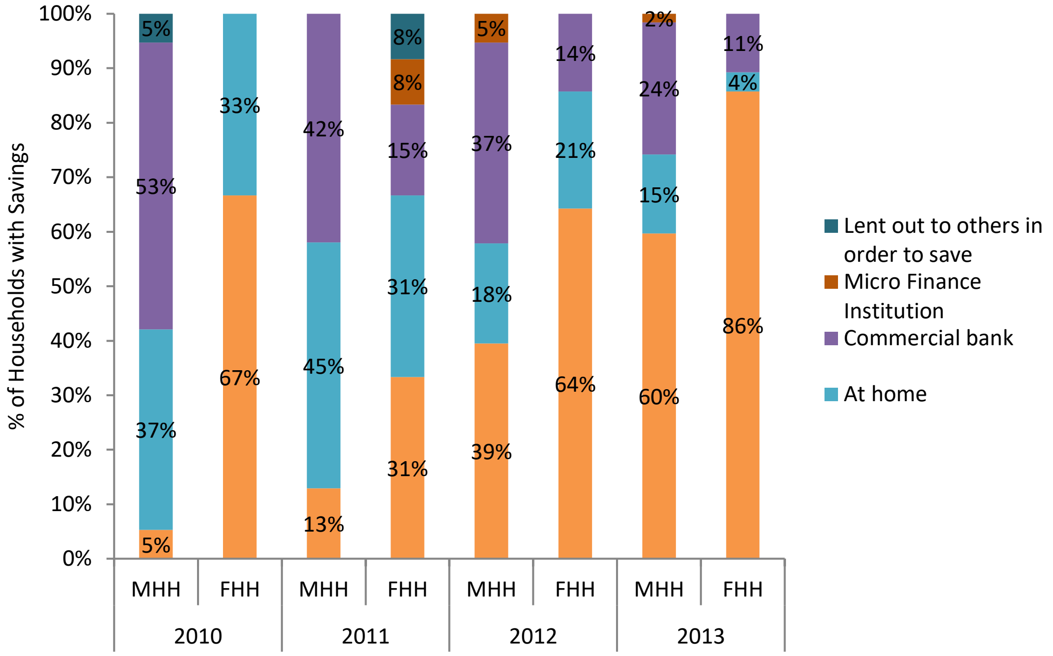


Figure 20: Location of Savings by Gender of Household Head



There were considerably more sources reported for accessing credit in comparison to savings. Again, VSLs emerged in 2013 as a source of credit for 23 per cent of households. However, money lenders, neighbours and a variety of 'other' sources appear to be the most common sources (e.g. traders, small grocers, small community groups) (Figure 21).

Figure 21: Source of Credit Accessed by Households

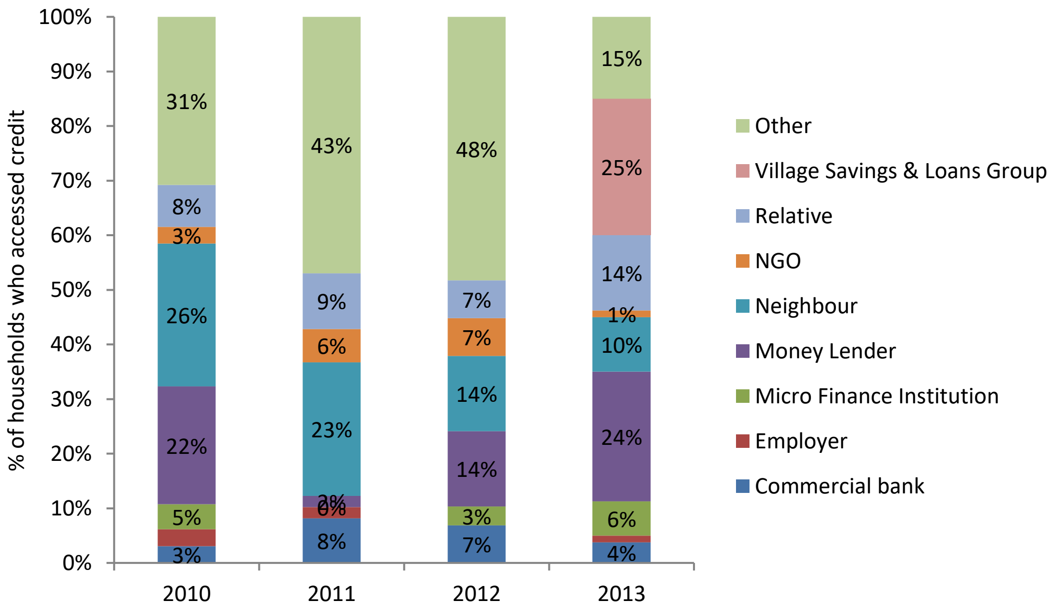
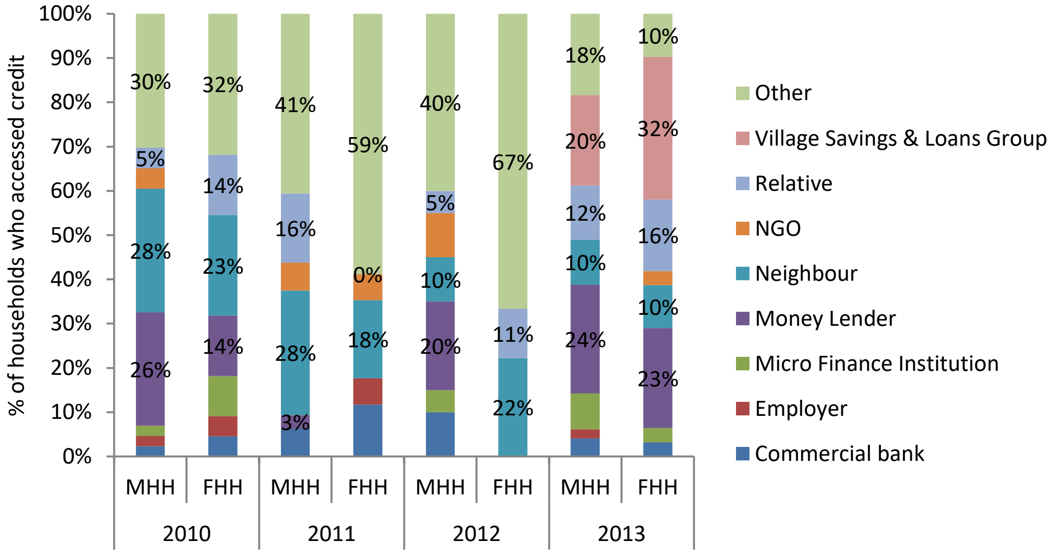


Figure 22: Source of Credit Accessed by Households by Gender of Household Head



The reasons for households obtaining credit are shown in Figure 23, with results disaggregated by gender of household head in Figure 24. The main reason for obtaining credit in 2013 was to purchase food for consumption with 30 per cent of households reporting this in comparison to 11 per cent in 2010. Other common reasons for accessing credit were purchasing inputs for production, educational costs, medical costs, and business start-up capital. These results provide insight into each household's capacity and priorities over the study period.

Figure 23: Reported Reasons for Households Taking Out Credit

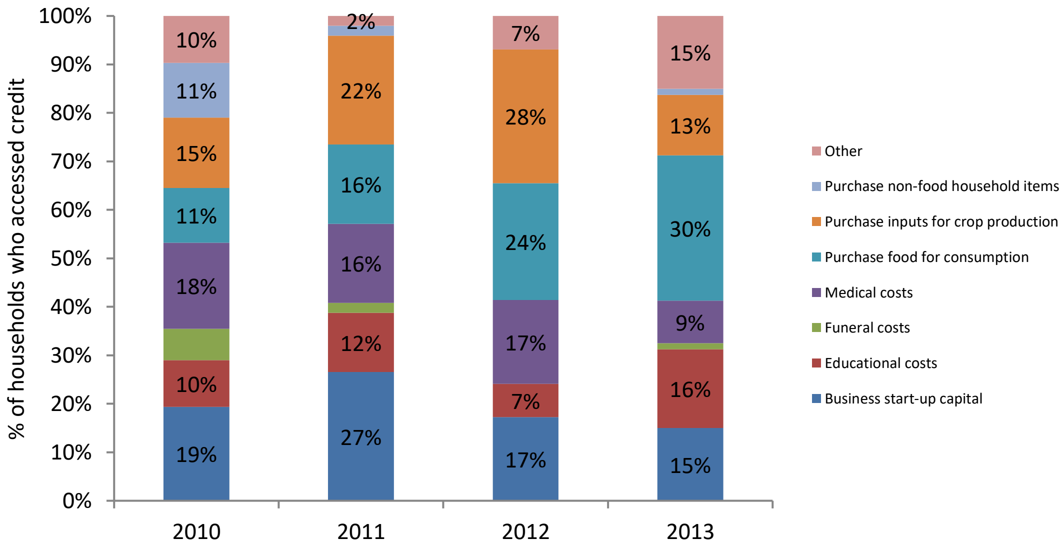
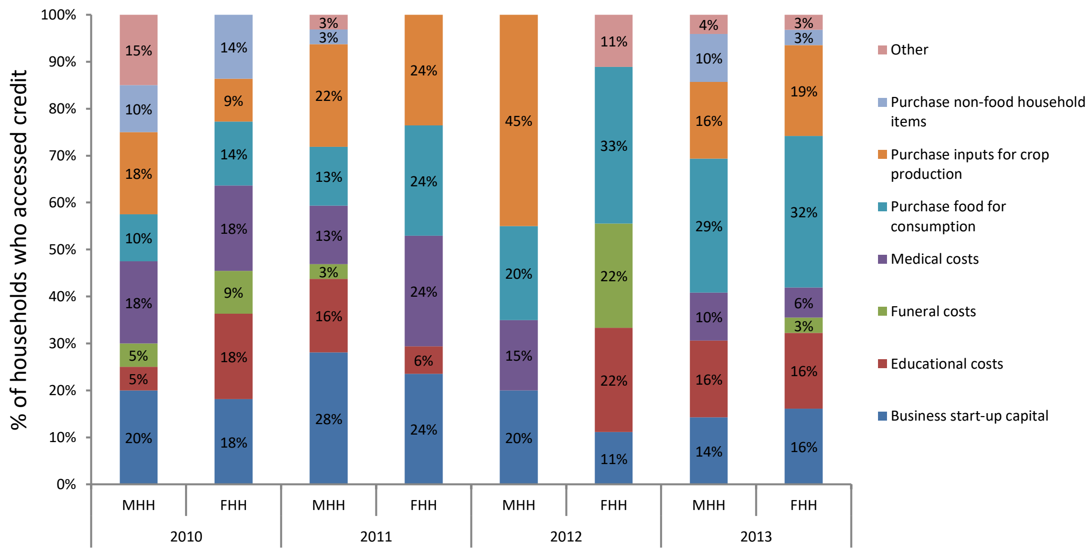
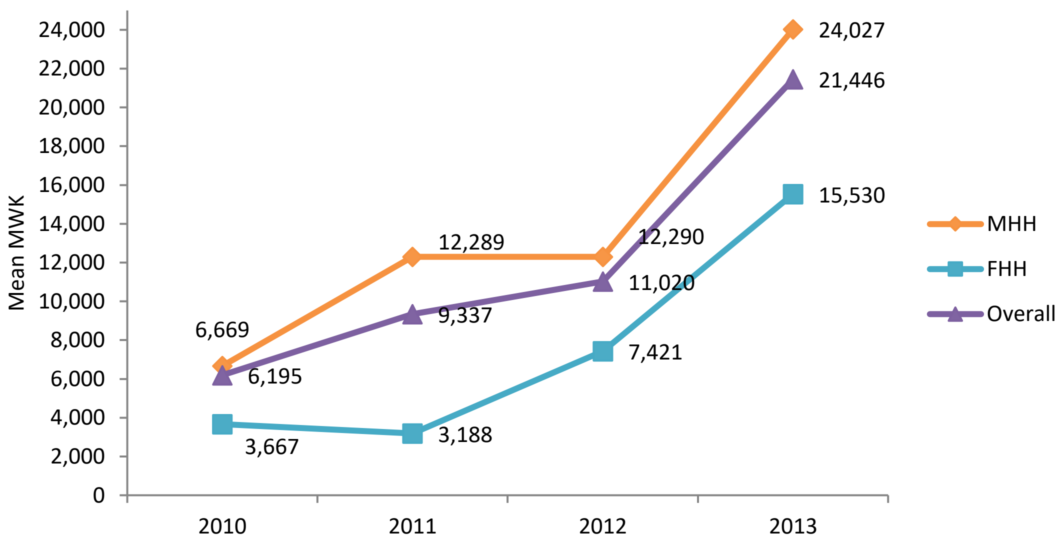


Figure 24: Reported Reasons for Households Taking out Credit



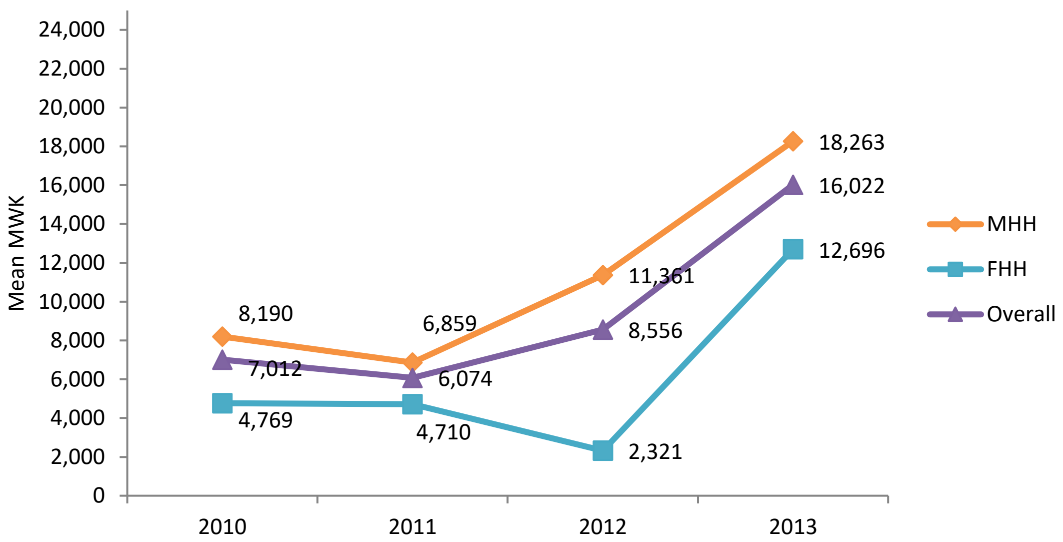
The mean amount saved increased significantly over the study period, going from 6,195 MWK in 2010 to 21,446 MWK in 2013 (Paired samples t-test; p=0.001). Every year male-headed households had saved more money than female-headed households. However, only in 2011 were these differences statistically significant, with male-headed households saving 12,289 MWK in comparison to 3,188 for female-headed households (Independent samples t-test; 2010 p=0.109; 2011 p=0.016; 2012 p=0.138; 2013 p=0.058) (Figure 25).

Figure 25: Mean Amount Saved by Households (MWK)



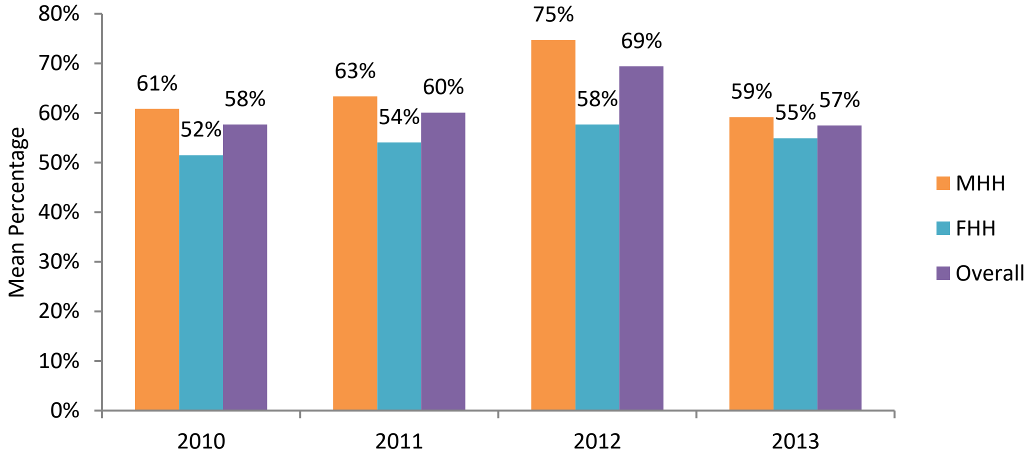
The mean amount of credit taken out by households increased significantly over the study period going from 7,012 MWK in 2010 to 16,022 MWK in 2013 (Paired samples t-test; p=0.039) (Figure 26). Again, like the mean amount saved, every year, male-headed households obtained a larger mean amount of credit in comparison to female-headed households. However, this difference was only statistically significant in 2012 (Independent samples t-test; 2010 p=0.092; 2011 p=0.302; 2012 p=0.000; 2013 p=0.134) (Figure 26).

Figure 26: Mean Amount of Credit Taken Out by Households (MWK)



The mean percentage of interest charged on credit is taken out by households remained relatively stable over the study period, going from 58 per cent in 2010 to 57 per cent in 2013 (Paired samples t-test; p=0.489). Similarly, there were no significant differences in the mean percentage of interest charge for male or female-headed households (Independent samples t-test; 2010 p=0.403; 2011 p=0.578; 2012 p=0.460; 2013 p=0.746).

Figure 27: Mean Percentage of Interest Charged on Credit Taken Out by Households



Livelihood Strategies:

The main source of income in the study areas for households was crop production. However, casual labour and non-agricultural enterprises were also important sources at various stages of the seasonal calendar.

During the final study round in 2013, six focus group discussions were held, three mixed gender and three all-female groups. In each of the study areas, an income matrix was constructed by the participants. The overall results showed that the most highly ranked source of income was the production of crops for sale, followed by casual/ganyu labour and small businesses (e.g. petty trading, grocery, mandazi selling, brewing beer for sale). In response to the question of how this has changed over the last five years (i.e. 2009-2013), group participants discussed how crop production is less profitable than it was before as inputs are more expensive and the prices received at the market are poor. The growing popularity of non-agricultural enterprises shows how households, who can invest, are beginning to diversify their income portfolios; although the reliability and impact of these small-scale businesses and casual labour are questionable due to the precarious and seasonal nature of such activities.

The diversification of rural economies in SSA is a long-standing recommendation by many experts and organizations. The ASWAp and MGD policies[11] both highlight and prioritize the diversification of household income to reduce the reliance on crop production and vulnerability to exogenous shocks such as climate change and price fluctuations. Paid employment, migration and remittances and non-agricultural enterprises were investigated amongst the study sample through the household questionnaire.

[11] The Agricultural Sector Wide Approach (ASWAp) and the Malawi Growth and Development (MGD) policies are discussed in the Howard Dalzell's paper "*Constraints faced by farmers and possible policy remedies"* (Dalzell, 2015)

Crop Production & Sales

Table 18 shows the main crops cultivated by households over the study period during the main rainfed season. These crops would have been planted after the main rains, typically in November, then five to six months later, the main harvest takes place. However, some households who may be in greater need would cultivate earlier; this is called the 'green harvest', occurring between February and March, which signifies the end of the lean season.

Over the study period maize was by far the predominant crop with much of the sample cultivating it each year; 99 per cent in 2008-07, 97 per cent in 2012-13, with little difference between male-headed and female-headed households (Table 18). Groundnut was the second most common crop grown; it acts as both a cash and food crop and has nitrogen-fixing properties, thus aiding soil fertility. In the 2008-09 season, 75 per cent of households cultivated groundnuts, with 79 per cent of households cultivating in 2012-13. Farmers appear to have shifted their preferences around the cultivation of tobacco and soya; 36 per cent of farmers cultivated tobacco in 2008-09, this declined significantly to 11 per cent in 2012-13 (McNemar's test; p=0.000); in contrast to this, soya cultivation increased from 13 per cent in 2010 to 25 per cent in 2012-13 (McNemar's test; p=0.002). There were no significant differences between what crops male-headed households cultivated in comparison to female-headed households.

Table 18: Percentage of Household Planting Each Crop

		2008-09	2011-12	2012-13
Maize	MHH	99%	98%	99%
	FHH	99%	98%	94%
	Overall	99%	98%	97%
Groundnut	MHH	76%	80%	80%
	FHH	72%	88%	78%
	Overall	75%	83%	79%
Soya	MHH	13%	35%	30%
	FHH	12%	19%	18%
	Overall	13%	31%	25%
Tobacco	MHH	45%	15%	11%
	FHH	36%	4%	10%
	Overall	42%	12%	11%
Cotton	MHH	10%	15%	16%
	FHH	10%	13%	9%
	Overall	10%	15%	13%

*** significant at 1%, ** significant at 5%, * significant at 10%

For maize, in the 2012-13 season male-headed households cultivated 0.59ha, significantly larger area in comparison to female-headed households cultivated 0.49ha (Independent samples t-test maize; 2008-09 p=0.408; 2011-12 p=0.71; 2012-13 p=0.027) (Table 19).

Although there were no significant differences in what crops male-headed households chose to cultivate in comparison to female-headed households, over the study period, there were a number of times when male-headed households were able to cultivate a significantly larger area of crops in comparison to female-headed households (Table 19).

For the overall sample, the mean area of groundnut cultivated remained stable over the study period going from 0.34ha in 2010 to 0.36ha in 2012-13 (One-way repeated measures ANOVA; 2008-09 vs 2011-12 vs 2012-13 p=0.306). In the 2011-12 season, male-headed households cultivated a significantly larger area of groundnut, 0.38ha, in comparison to female-headed households, 0.27ha (Independent samples t-test; 2008-09 p=0.292; 2011-12 p=0.000; 2012-13 p=0.774).

Although soya grew in popularity over the study period, as highlighted previously, the area allocated to soya remained stable with around 0.22ha dedicated to soya, this is understandable as it is likely to have been used for intercropping with maize or other crops. There were no significant differences between the mean area of land planted by male-headed households in comparison to female-headed households (Independent samples t-test; 2011-12 p=0.364; 2012-13 p=0.253).

Similarly, the mean area planted with tobacco remained stable at around 0.41ha (2012-13). Only in the 2012-13 season was there a significant difference in the area cultivated by male-headed households, 0.47ha, in comparison to 0.30ha for female-headed households (Independent samples t-test; 2011-12 p=0.099; 2012-13 p=0.049).

The mean area of land allocated to cotton also remained stable around 0.03ha (2012-13). At no time over the study period was there a significant difference in the area cultivated by male-headed households in comparison to female-headed households (Independent samples t-test; 2011-12 p=0.151; 2012-13 p=0.528).

Table 19: Mean Number of Hectares Planted by Crop Type (ha)

		2008-09	2011-12	2012-13
Maize	MHH	0.60	0.69	0.59
	FHH	0.54	0.58	0.49
	Overall	0.58	0.66	0.55
Groundnut	MHH	0.33	0.38	0.37
	FHH	0.37	0.27	0.35
	Overall	0.34	0.35	0.36
Soya	MHH	-	0.23	0.2
	FHH	-	0.28	0.28
	Overall		0.24	0.22
Tobacco	MHH	-	0.39	0.47
	FHH	-	0.2	0.3
	Overall		0.37	0.41
Cotton	MHH	-	0.4	0.35
	FHH	-	0.29	0.29
	Overall	-	0.37	0.33

*** significant at 1%, ** significant at 5%, * significant at 10%

The primary objective for most rural households in Malawi is to produce enough maize to meet their annual consumption needs, regardless of price and supply volatility of maize, and the opportunity cost of alternative strategies. Ellis et al attribute this to households lack of confidence in the ability to secure sufficient maize from the market in the lean season (Alwang and Siegel, 1999; Orr and Mwale, 2001; Ellis, Kutengule and Nyasulu, 2003).

Over the study period, there were significant changes in the volume of maize and groundnut harvested. The mean quantity of maize harvested in 2008-09 was 795kgs; this increased to 884kgs in 2011-12; however, there was a significant decline to 758kgs in the 2012-13 season (One-way repeated measures; p=0.003; 2011-12 vs 2012-13 p=0.002) (Table 20). These trends provide an insight into the variable nature of maize harvest despite the same amount of land allocated. The decrease in maize production over the study period was especially drastic for female-headed households who saw a reduction from 778kgs in 2008-09 to 564kgs in 2012-13, in contrast to male-headed households who experienced an increase from 805kgs in 2008-09 to 883kgs in 2012-13, the difference between male-headed and female-headed households in 2012-13 was significant (Independent samples t-test; 2008-09 p=0.804; 2011-12 p=0.093; 2012-13 p=0.001) (Table 20). Unfortunately, due to the fluid nature of household head gender, it is not possible to test the change over time for male/female-headed households (i.e. a household could have had a male head for one study round then female for the next, there for the samples are not independent).

There was a significant and steady increase in the volume of groundnuts harvested, despite the area of land allocated remaining constant. A mean of 155kgs of groundnuts were harvested in the 2008-09 season, this increased to 210kgs in 2011-12, and increased again to 318kgs in 2012-13 (One-way repeated measures; p=0.000; 2008-09 vs. 2012-13 p=0.000; 2011-12 vs. 2012-13 p=0.000) (Table 20). This positive trend was true for both male-headed and female-headed households, with no significant difference between the two groups (Independent samples t-test; 2008-09 p=0.242; 2011-12 p=0.232; 2012-13 p=0.326) (Table 20).

The mean quantity of soya harvested remained steady over the study period, with no difference between male-headed and female-headed households. It appears as if there was a decrease in the amount of tobacco harvested going from 265kgs in 2008-09 to 484kg in 2012-13. However, this is not significant given the small sub-sample reporting tobacco cultivation; 82 households in 2008-09 (42 per cent) and only 21 households in 2012-13 (11 per cent).

Likewise, for cotton, it appears as if there was a decrease in production from 285kgs harvested in the 2008-09 season to 159kgs in 2012-13. However, this is not significant as it only represents 19 households in 2008-09 (10 per cent) and 25 households in 2012-13 (13 per cent).

Table 20: Mean Quantity Harvested by Crop (KG)

		2008-09	2011-12	2012-13
Maize	MHH	805	934	883
	FHH	778	748	564
	Overall	795	884	758
Groundnut	MHH	145	224	353
	FHH	174	178	264
	Overall	155	210	318
Soya	MHH	137	97	104
	FHH	91	82	83
	Overall	123	95	98
Tobacco	MHH	250	247	659
	FHH	298	105	199
	Overall	265	234	484
Cotton	MHH	353	211	181
	FHH	169	126	111
	Overall	285	190	159

*** significant at 1%, ** significant at 5%, * significant at 10%

Table 20 presents the mean yields (kg/ha) harvested for the main crops over the study period. The decrease in the amount of maize harvested, especially for female-headed households, is reflected in the mean maize yields, going from 1,460kg/ha in 2008-09 to 557kg/ha in 2012-13 (One-way repeated measures; overall p=0.000; 2008-09 vs 2012-13 p=0.000; 2011-12 vs 2012-13 p=0.000). The significantly large decreases in 2012-13 are in line with the July to December 2013 FEWSNET bulletin where it was reported that;

"The 2012-13 agricultural season was characterized by a two to the three-week delayed start of the season in the southern and central regions, erratic rainfall, and

early cessation of rainfall in the surplus central and northern areas…Reports from the Kasungu ADD, located in the central region, indicate a 19 per cent reduction in total maize production when compared to last year" (FEWSNET, 2013, p2).

In addition to this, in the 2012-13 season, fertiliser prices were 'extremely high', and the price of maize grain during the lean season was more than double the 2012 prices, which may have caused households to start consuming maize from the field earlier than usual (FEWSNET, 2013).

Despite challenges around maize production, groundnut yields increased significantly over the study period going from 480kg/ha in 2008-09 to 882kg/ha in 2012-13 (One-way repeated measures; overall p=0.000; 2008-09 vs 2012-13 p=0.000; 2011-12 vs 2012-13 p=0.001). Unlike maize, there were no significant differences in groundnut yields achieved by male-headed households in comparison to female-headed households (Independent samples t-test; 2008-09 p=0.238; 2011-12 p=0.335; 2012-13 p=0.806). Like the mean quantity harvested for soya, tobacco, and cotton, there was no significant change in the overall mean yields harvested over the study period (Table 21).

Table 21: Mean Yield Harvested per Hectare by Crop Type (kg/Ha)

		2008-09	2011-12	2012-13
Maize	MHH	1,457	1,366	696
	FHH	1,467	1,365	344
	Overall	1,460	1,366	557
Groundnut	MHH	475	624	946
	FHH	489	718	782
	Overall	480	652	882
Soya	MHH	-	491	639
	FHH	-	518	368
	Overall	-	496	562
Tobacco	MHH	-	862	1,292
	FHH	-	519	657
	Overall	-	831	1,050
Cotton	MHH	-	598	604
	FHH	-	454	422
	Overall	-	560	547

*** significant at 1%, ** significant at 5%, * significant at 10%

Regarding crop sales, groundnut was the most common crop sold over the study period. The percentage of household selling groundnuts increased from 55 per cent of households 2008-09 to 68 per cent of households selling in 2011-12 (McNemar's test; 2008-09 vs 2011-12 p=0.005) (Table 22). Over the study period, the percentage of households selling maize remained stable at around 30 per cent in the 2008-09 season, increasing to 32 per cent in 2011-12 (Table 22). The proportion of households reporting selling soya increased over the study period going from 10 per cent in 2008-09 to 25 per cent in 2011-12, whilst tobacco saw considerable declines going from 42 per cent of households selling in 2008-09 to 21 per cent of households in 2010-11 (Table 22).

Table 22: Percentage of Households Selling by Crop Type

		2008-09	2010-11	2011-12
Maize	MHH	32%	34%	34%
	FHH	28%	29%	28%
	Overall	30%	33%	32%
Groundnut	MHH	56%	64%	70%
	FHH	52%	65%	65%
	Overall	55%	65%	68%
Soya	MHH	12%	20%	30%
	FHH	7%	10%	16%
	Overall	10%	17%	25%
Tobacco	MHH	45%	24%	*
	FHH	36%	10%	*
	Overall	42%	21%	*
Cotton	MHH	10%	8%	17%
	FHH	9%	8%	8%
	Overall	9%	8%	13%

*2013 data collection was too early in the season for the 2012/13 tobacco sales to be fully captured

Apart from groundnut sales, the mean amount of the other main crops sold remained largely stable over the study period. The mean quantity of groundnuts sold by households in 2008-09 was 122kg, each year this increased, with a significant overall increase to 211kg in the 2011-12 season (One-way repeated measures; overall p=0.017; 2008-09 vs 2011-12 p=0.010; 2010-11 vs 2011-12 p=0.035).

Regarding gender differences in crop sales, in 2008-09, male-headed households sold statistically more groundnuts than female-headed households; 143kg in comparison to 80kg. All other year's male-headed households sold more groundnuts that female-headed households, but this was not significant (Independent samples t-test; 2008-09 p=0.008; 2010-11 p=0.721; 2011-12 p=0.409).

Other crops that show significant differences between male-headed and female-headed households included maize; in 2008-09 with 457kgs versus 224kg respectively; in 2010-11 with 408kg versus 213kg respectively, there was also a gendered difference with soya in 2008-09 with 156kg versus 66kg respectively.

Table 23: Mean Quantity Sold by Crop Type (kg)

		2008-09	2010-11	2011-12
Maize	MHH	457	408	438
	FHH	224	213	277
	Overall	382	363	380
Groundnut	MHH	143	179	225
	FHH	80	164	188
	Overall	122	175	211
Soya	MHH	156	88	105
	FHH	66	119	63
	Overall	133	93	94
Tobacco	MHH	250	350	382
	FHH	298	208	245
	Overall	265	333	336
Cotton	MHH	345	233	253
	FHH	153	208	243
	Overall	281	226	251

*** significant at 1%, ** significant at 5%, * significant at 10%

Three crops saw significant increases in the mean income received from sales; maize increased from 9,892 MWK in 2008-09 to 31,658 MWK in 2011-12; groundnut increased from 7,874 MWK in 2008-09 to 39,815 MWK in 2011-12; and tobacco increased from 39,309 MWK in 2008-09 to 151,204 MWK in 2011-12 (Maize Paired samples t-test; 2010-11 vs. 2011-12 p=0.000; 2008-09 vs. 2011-12 p=0.001) (Groundnut One-way repeated measures test; Overall p=0.000; 2008-09 vs. 2011-12 p=0.008; 2008-09 vs. 2011-12 p=0.000; 2010-11 vs. 2011-12 p=0.003) (Soya Paired samples t-test; 2010-11 vs. 2011-12 p=0.758; 2008-09 vs. 2011-12 p=0.689) (Tobacco Paired samples t-test; 2010-11 vs. 2011-12 p=0.075; 2008-09 vs. 2011-12 p=0.041)

(Cotton Paired samples t-test; 2010-11 vs. 2011-12 p=0.187; 2008-09 vs. 2011-12 p=0.171).

There were only three instances where male-headed households earned a significantly larger income from crop sales in comparison to female-headed households; in 2010-11 male-headed households earned a mean income of 16,438 MWK from maize in comparison to 6,528 MWK for female-headed households (p=0.004); in 2011-12 for soya, the difference was 6,667 MWK versus 3,056 MWK (p=0.011) respectively, and in 2008-09 for cotton, the difference was 11,075 MWK in comparison to 3,883 MWK (p=0.030).

Table 24: Mean Income Earned by Crop Type (MWK)

		2008-09	2010-11	2011-12
Maize	MHH	10,813	16,438	32,438
	FHH	8,050	6,528	30,321
	Overall	9,892	14,200	31,658
Groundnut	MHH	8,683	42,640	41,073
	FHH	6,235	29,521	37,801
	Overall	7,874	24,067	39,815
Soya	MHH	5,670	4,942	6,667
	FHH	5,120	3,584	3,056
	Overall	5,525	4,767	5,704
Tobacco	MHH	34,435	47,425	142,725
	FHH	49,808	34,811	163,923
	Overall	39,309	46,097	151,204
Cotton	MHH	11,075	21,150	21,068
	FHH	3,883	26,780	13,682
	Overall	8,678	22,909	19,364

*** significant at 1%, ** significant at 5%, * significant at 10%

For all crops, there were significant increases in the price received per kg over the study period (Table 25). Maize increased from 31.45 MWK/kg in 2008-09 to 96.34 MWK/kg in 2011-12 (Paired samples t-test; p=0.000). There was no significant difference in the price received by male-headed households in comparison to female-headed households (Independent samples t-test; 2008-09 p=0.117; 2010-11 p=0.752; 2011-12 p=0.353) (Table 25).

The price received for groundnuts increased from 73.05 MWK/kg in 2008-09 to 207.31 MWK/kg in 2011-12 (Paired samples t-test; p=0.000). The 2010-11 season was the only season where there was a significant difference in the mean price per/kg received by male-headed households (134.38 MWK/kg) in comparison to female-headed households (100.72 MWK/kg) (Independent samples t-test; 2008-09 p=0.063; 2010-11 p=0.014; 2011-12 p=0.554) (Table 25).

The price per kg received for soya increased from 61.15 MWK/kg in 2008-09 to 85.04 MWK/kg in 2011-12 (Paired samples t-test; p=0.048). There was no significant difference in the price received by male-headed households in comparison to female-headed households (Independent samples t-test; 2008-09 p=0.535; 2010-11 p=0.431; 2011-12 p=0.879) (Table 25).

The price per kg received for tobacco increased from 32.31 MWK/kg in 2008-09 to 84.92 MWK/kg in 2011-12 (Paired samples t-test; p=0.006). There was no significant difference in the price received by male-headed households in comparison to female-headed households (Independent samples t-test; 2008-09 p=0.434; 2010-11 p=0.737; 2011-12 p=0.191) (Table 25).

The price per kg received for cotton increased from 156.05 MWK/kg in 2008-09 to 792.66 MWK/kg in 2011-12 (Paired samples t-test; p=0.003). There was no significant difference in the price received by male-headed households in comparison to female-headed households (Independent samples t-test; 2008-09 p=0.232; 2010-11 p=0.488; 2011-12 p=0.625) (Table 25).

Table 25: Mean Price Received Per kg by Crop Type (MWK/kg)

		2008-09	2010-11	2011-12
Maize	MHH	29.69	41.36	92.67
	FHH	35.16	39.27	103.15
	Overall	31.45	40.91	96.34
Groundnut	MHH	68.31	134.38	202.95
	FHH	82.26	100.72	214.53
	Overall	73.05	125.46	207.31
Soya	MHH	57.91	60.52	84.53
	FHH	70.86	75.31	86.33
	Overall	61.15	62.43	85.04
Tobacco	MHH	34.69	89.78	92.85
	FHH	26.75	75.37	58.49
	Overall	32.31	85.54	84.92
Cotton	MHH	151.35	134.9	828.48
	FHH	166.36	148.75	712.09
	Overall	156.05	136.35	792.66

*** significant at 1%, ** significant at 5%, * significant at 10%

Year on year, there was a significant change in the total mean amount of income earned from all crop sales (Table 26). The total mean income earned went from 14,775 MWK in 2008-09 to 43,379 MWK in 2010-11, this increased again to 50,537 MWK in 2011-12 (One-way repeated measures; overall p=0.000; 2008-09 vs. 2010-11 p=0.000; 2008-09 vs. 2011-12 p=0.000; 2010-11 vs. 2011-12 0.014). Although each year male-headed households earned a higher mean income from crop sales in comparison to female-headed households, only in 2008-09 was this difference significant (Independent samples t-test; 2008-09 p=0.046; 2010-11 p=0.127; 2011-12 p=0.141) (Table 26).

Table 26: Mean Total Income Received from All Crop Sales (MWK)

	2008-09	2010-11	2011-12
MHH	16,822	48,270	55,876
FHH	11,128	28,829	41,259
Overall	14,775	43,379	50,537

*** significant at 1%, ** significant at 5%, * significant at 10%

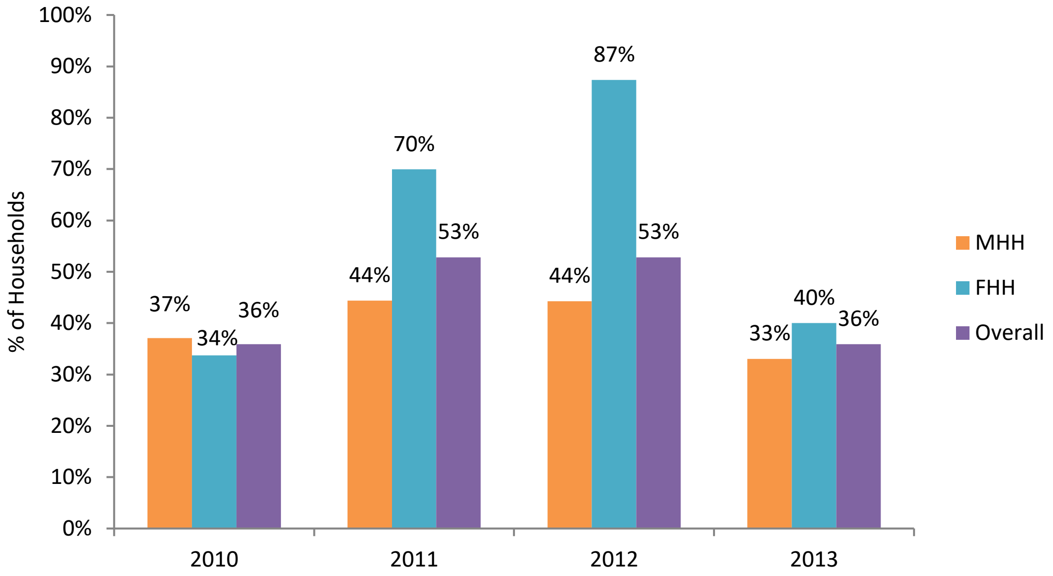
FGDs in 2013 with the ExAgris supported association members in Mchinji, Salima and Lilongwe showed that there was a consensus around the positive impact of associations and extension services on crop production. Reasons given for this include the adoption of the Shakawawa method (i.e. double planting seeds, minimum tillage and use of mulch), post-harvest processing and how to apply fertiliser correctly. When asked about the impact of this the common term used was "*bumper harvests*", meaning that farmers were able to increase their yields. However, when asked *"Overall, has crop farming become more risky, stayed the same, or become less risky over the past five years?"* all participants across the three FGDs agreed that farming had got more risky as a livelihood strategy. Reasons given for this include how increased rainfall variability, increasing cost of inputs, and poor market prices for produce, with one farmer in Mchinji explaining, *"no matter what effort they put in they are still getting poor prices*". Another reason given was the increased prevalence of crop disease.

Paid Employment

The number of households gaining an income from paid work fluctuated over the study period. In 2010, 36 per cent of households engaging in paid employment, this increased to 53 per cent in 2011 and 2012. However, the percentage dropped back down to 36 per cent of households in 2013 (Figure 28). The decline back down to the 2010 level may be related to the poor maize harvest in 2013, as mention in the previous section.

Female-headed households appear to have pursued paid employment more than male-headed households in 2010 (70 per cent vs 44 per cent), in 2012 (87 per cent vs 44 per cent) and in 2013 (40 per cent vs 33 per cent). Although chi-square test showed that none of these differences was statistically different (2010 p=0.979; 2011 p=0.447; 2012 1.000; 2013 p=0.226), focus group discussion participants explained how the most vulnerable were more reliant on ganyu labour as a source of cash and food; however male-headed households were in a stronger position to pursue this option typically as these households have greater labour capacity than female-headed households.

Figure 28: Households reporting that Members Carried out Paid Work in the Last 7 Days



The mean number of hours worked by households in the previous seven days ranged from 10.6 hours in 2010 to 21.0 hours in 2013 (Table 27). There was no significant difference in the number of hours worked over the study period or between male-headed and female-headed households (Paired samples t-test; 2010 vs 2013 p=0.291) (Independent samples t-test; 2010 p=0.830; 2011 p=0.934; 2012 p=0.898; 2013 p=0.346).

Casual labour can be paid in cash or in-kind, where the person was paid in kind the estimated cash value was recorded. The mean income earned by households fluctuated over the study period increasing from 727 MWK in 2010 to 1,476 MWK in 2011, decreasing to 883 MWK in 2012, and increasing again to 1,152 MWK in 2015 (Paired samples t-test; 2010 vs. 2013 p=0.301) (Independent samples t-test; 2010 p=0.348; 2011 p=0.750; 2012 p=0.155; 2013 p=0.877) (Table 27).

Although these fluctuations were not detected as being statistically significant, a drop in real wages during the 2012-13 cropping season was reported as being a result of rising maize prices which have been affected by devaluation and export and inflationary pressures (Dorward et al., 2013). However, causes for the other fluctuations were not determined.

Table 27: Mean Hours Worked, Waged Earned and Hourly Rate from Paid Employment

		2010	2011	2012	2013
Total Hours Worked	MHH	10.4	22.9	11.3	23.0
	FHH	11.1	22.6	11.1	18.6
	Overall	10.6	22.8	11.3	21.0
Total Wages Earned	MHH	794	1,443	970	1,134
	FHH	608	1,534	638	1,173
	Overall	727	1,476	883	1,152

The most common type of paid employment or work reported over the four years was agricultural (Table 28). A decline in the prevalence of sorting and packing of tobacco has been replaced with construction (i.e. making bricks and drawing water to make bricks). The reduction in tobacco sorting and packing is largely due to the decline in the cultivation of the crop over the study period. However the timing of the data collection must also be taken into account - the baseline data collection was between March to May, which is the peak labour demand for the harvesting and hanging of tobacco leaves, whereas the subsequent data collection periods were around the month of July when tobacco is sent to auction floors.

Casual agricultural labour, or 'ganyu' labour, is the most common type of paid work in rural Malawi, especially for subsistence farming households, and is an important income source often used as a coping strategy. Ganyu labour is generally piecework where labourers are given a task (e.g. planting or weeding) and paid on completion of the task. Demand for ganyu labour peaks during the planting season between September and January. This time of year, especially for the poorest households, cash tends to be scarce, food stocks are low, and households begin to purchase maize for consumption at its highest price.. Households hiring out their labour often face labour shortages when it comes to planting their own plots, increasing the risk of failed crops or poor yields.

In 2013, participants in a female only FGD in Salima discussed about how doing ganyu labour as a female headed household is not easy. The women explained that, for male headed households, the income from ganyu labour is larger because men are physically stronger and can easily prepare fields. Also, men have more time to undertake ganyu labour as they are not responsible for household chores or childcare. For female-headed households, women undertaking ganyu labour send the children to the home plot and join them later in the day and continue working into the late evening. The women in this group expressed how ganyu labour helps bring in some income, however the money is not enough to meet all basic household needs. In terms of securing more permanent jobs, the participants mentioned that they could get a job at the ExAgris estate, but the long working hours are not suitable for women because they are expected to cook, fetch water, clean and take care of the children.

Participants from the female only FGD in Mchinji in 2013 expressed how ganyu helps to earn a little money to buy vegetables, grasshoppers, caterpillars, soap, salt and other small items. However, ganyu causes them to neglect their own crops and the children are left at home alone all day and often do not eat. One woman added how they themselves suffer because they spend all day working, and don't eat because they don't have time to cook.

Table 28: Types of Paid Employment Households Engaged in (%)

		2010	2011	2012	2013
Agriculture (ganyu)	MHH	26%	60%	63%	27%
	FHH	26%	70%	66%	36%
	Overall	26%	64%	64%	31%
Construction	MHH	0%	7%	8%	7%
	FHH	1%	6%	2%	9%
	Overall	1%	7%	6%	8%
Guard	MHH	1%	3%	1%	2%
	FHH	0%	0%	0%	0%
	Overall	1%	2%	1%	1%
Sorting/packing tobacco	MHH	5%	2%	0%	0%
	FHH	7%	2%	0%	0%
	Overall	6%	2%	0%	0%
Other	MHH	3%	5%	4%	2%
	FHH	3%	5%	4%	5%
	Overall	3%	5%	4%	3%

Non-Agricultural Enterprises

Ownership of non-agricultural enterprises increased from 28 per cent in 2010 to 32 per cent in 2013, however there were significant decreases in between 2010 and 2013 (Paired samples t-test; 2010 vs. 2011 p=0.017; 2011 vs. 2012 p=1.000; 2012 vs. 2013 p=0.007; 2010 vs. 2013 p=0.712) (Independent samples t-test; 2010 p=0.990; 2011 p=0.644; p=0.646; 2013 p=0.019) (Table 29). There were no significant differences in the percentages of male-headed households reporting owning enterprises in comparison to female-headed households in all study years, apart from 2013 (Table 29).

Table 29: Percentage of Households Reporting Having a Non-Agricultural Enterprise

	2010	2011	2012	2013
MHH	28%	20%	18%	41%
FHH	29%	16%	19%	20%
Overall	28%	18%	18%	32%

*** significant at 1%, ** significant at 5%, * significant at 10%

The female focus group discussions spoke repeatedly about the start-up of small businesses and how it has grown in popularity, this is evident in the distribution of the types of enterprises reported over the four years. Petty trading, small-scale groceries and the making and selling of baked goods were the most common types of enterprises owned by households. Focus group discussion participants stressed that the profits made from a small business were minimal, making only enough to cover the running costs and contribute to some basic household expenditures (e.g. purchasing soap, salt, educational fees).

Table 30: Distribution of Types of Non-agricultural Enterprises

		2010	2011	2012	2013
Brewing and distilling local beers	MHH	1%	2%	1%	4%
	FHH	10%	5%	8%	5%
	Overall	4%	3%	3%	5%
Making and selling baked foods	MHH	7%	5%	1%	4%
	FHH	6%	2%	2%	5%
	Overall	7%	4%	2%	5%
Making mats/baskets	MHH	2%	0%	2%	2%
	FHH	0%	0%	0%	0%
	Overall	1%	0%	2%	1%
Other	MHH	2%	1%	3%	2%
	FHH	1%	0%	0%	3%
	Overall	2%	2%	2%	2%
Petty trading/grocery	MHH	13%	9%	11%	21%
	FHH	6%	9%	6%	6%
	Overall	10%	8%	10%	15%
Restaurant/tea room	MHH	3%	2%	1%	3%
	FHH	1%	0%	0%	1%
	Overall	3%	2%	1%	2%
Selling firewood/charcoal	MHH	2%	1%	0%	2%
	FHH	1%	0%	0%	0%
	Overall	2%	1%	0%	1%

The income gained from a business was difficult to accurately estimate due to the precarious nature of these small-scale businesses and the low level of literacy and numeracy skills (Table 31). Many of these enterprises are seasonal in nature; the peak business period is typically post-harvest when households begin to sell crops, and cash is more available.

Table 31: Mean Annual Income from Non-Agricultural Enterprise

	2010	2011	2012	2013
MHH	2,756	8,732	4,365	21,666
FHH	2,327	4,788	1,635	20,184
Overall	2,582	7,581	3,758	21,242

Migration & Remittances

Remittances from migration were not a common source of income amongst the study sample. The number of households with a member away for work went from 5.1 per cent in 2010 to 13.8 per cent in 2011, the highest point, then decreased to 5.6 in 2012 and further decreased to 2.5 per cent in 2013. Casual labour, agriculture, and visiting other family members were the main reasons for migration with the majority being within their home districts.

Table 32: Number of Households Reporting Having a Household Member Migrated

	2010	2011	2012	2013
MHH	6.3%	13.1%	7.0%	3.5%
FHH	2.9%	15.1%	1.9%	1.3%
Overall	5.1%	13.8%	5.6%	2.5%

Vulnerability & Gender Equality

Household Level Shocks and Ability to Respond

Between the 2011 to 2013 study rounds, participants were asked to list the three most significant shocks experienced at the household level in the past 12 months. The average number of shocks reported, out of a possible of three, ranged between 1.63 in 2012 to 1.87 in 2013, this increase was statistically significant (Paired samples t-test; 2011 vs 2012 p=0.241; 2011 vs 2013 p=0.263; 2012 vs 2013 p=0.009) (Table 33). There were no significant differences in the mean number of shocks reported by male-headed households in comparison to female-headed households (Table 33).

Table 33: Mean number of shocks out of three experienced by households in the past 12 months

	2011	2012	2013
MHH	1.69	1.64	1.81
FHH	1.86	1.62	1.96
Overall	1.75	1.63***	1.87***

*** significant at 1%, ** significant at 5%, * significant at 10%

There was a wide variety of shocks reported each year. The first most common shock to households was lower crop yields due to drought or floods which affected between 21.37 per cent of households in 2013 up to 28.30 per cent of households in 2012 (Table 34). The second most common shock to households was illness or accident involving a household member, which affected 13.84 per cent of households in 2012 up to 21.99 per cent of households in 2011 (Table 34). The third most common shock to households was the death of a household member, which affected 14.15 per cent of households in 2012 up to 16.13 per cent of households in 2011 (Table 34). There were no notable differences in shocks experienced by male-headed households in comparison to female-headed households (Table 35).

Table 34: Distribution of Main Shocks Experienced by Households in the Last 12 Months

	2011	2012	2013
Household Dynamics & Health:			
Birth in the household	1.17%	0.63%	0.27%
Illness or accident of household member	21.99%	13.84%	20.00%
Death in the household	16.13%	14.15%	15.07%
Break-up of the household	2.64%	4.09%	3.84%
Market Related:			
Large fall in sale prices for crops	7.04%	5.97%	3.29%
The large rise in the price of food	5.57%	5.66%	8.77%
Lack of agricultural inputs	-	-	4.11%
Loss/Damage to Productive Assets:			
Crop disease or crop pests	6.45%	7.55%	4.11%
Livestock died or was stolen	7.04%	4.72%	4.66%
Lower crop yields due to drought or floods	22.87%	28.30%	21.37%
Dwelling damaged destroyed	1.76%	1.89%	3.56%
Theft	2.64%	6.92%	6.58%
Other	4.69%	6.29%	4.38%

*** significant at 1%, ** significant at 5%, * significant at 10%

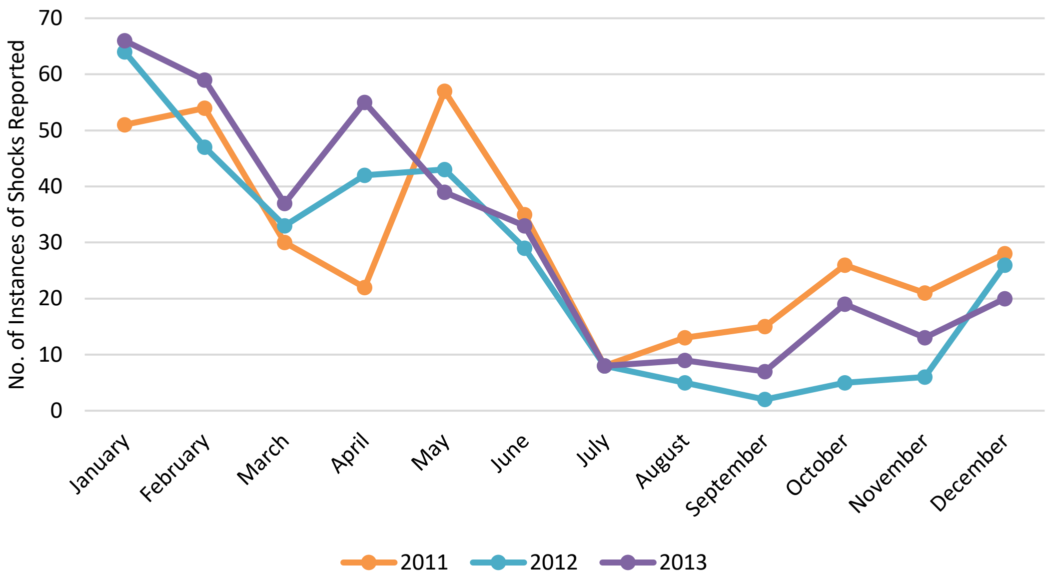
Table 35: Distribution of Main Shocks Experienced by Gender of Household Head

		2011	2012	2013
Household Dynamics & Health:				
Birth in the household	MHH	1.82%	0.43%	0.48%
	FHH	-	1.19%	-
Illness or accident of household member	MHH	19.09%	12.39%	21.90%
	FHH	27.27%	17.86%	17.42%
Death in the household	MHH	17.27%	13.68%	10.00%
	FHH	14.05%	15.48%	21.94%
Break-up of the household	MHH	1.36%	4.27%	1.43%
	FHH	4.96%	3.57%	7.10%
Market Related:				
Large rise in price of food	MHH	5.91%	5.98%	10.00%
	FHH	4.96%	4.76%	7.10%
Large fall in sale prices for crops	MHH	7.73%	6.84%	3.81%
	FHH	5.79%	3.57%	2.58%
Lack of agricultural inputs	MHH			4.76%
	FHH			3.23%
Loss/Damage to Productive Assets:				
Crop disease or crop pests	MHH	5.45%	8.12%	3.33%
	FHH	8.26%	5.95%	5.16%
Livestock died or was stolen	MHH	9.09%	4.27%	4.76%
	FHH	3.31%	5.95%	4.52%
Lower crop yields due to drought or floods	MHH	21.36%	27.35%	21.90%
	FHH	25.62%	30.95%	20.65%
Dwelling damaged destroyed	MHH	1.82%	1.71%	4.29%
	FHH	1.65%	2.38%	2.58%
Theft	FHH	3.64%	8.12%	8.57%
	MHH	0.83%	3.57%	3.87%
Other	MHH	5.45%	6.84%	2.86%
	FHH	3.31%	4.76%	3.87%

*** significant at 1%, ** significant at 5%, * significant at 10%

By looking at the month that households experienced their most significant shocks, an important trend emerges (Figure 29: Distribution of Shocks by MonthFigure 29). The majority of household shocks occur between January and May, during the lean season. Every year the occurrence of shocks drop-off in July, harvest time, but begin to steadily increase later in the year.

Figure 29: Distribution of Shocks by Month



Looking at the action's households took in response to shocks gives an insight into their ability to cope. The top three responses taken each year by households are highlighted in grey in Table 36. Every year the most common response was to do nothing. As this was an open text question, some details on why this was so common can be gleaned from the data. Many households reported they were unable to do anything because they had no resources, lacked labour or they felt that the shock was outside of their control (e.g. failed rains).

The second most common response for all years was to spend savings; this shows the important role savings play in buffering the impact shocks experienced. In 2011 and 2012, the second most common response was to turn to casual labour or to work more. However, in 2013, the third most common response shifted to 'other' which included a variety of responses.

Table 36: Distribution of Responses to Shocks Experienced in the Past 12 Months

	2011	2012	2013
Borrowed money	5.52%	0.94%	3.54%
Spent savings	20.93%	22.64%	19.62%
Sold livestock	3.20%	2.20%	3.54%
Sold more crops	5.52%	0.94%	4.36%
Casual labour/worked more	12.21%	8.81%	5.72%
Reduced food consumption/Consumed less preferred food	5.52%	1.89%	3.54%
Reduced non-food expenditures	1.16%	2.52%	2.72%
Relied on support from NGO/Church/Govt	1.74%	0.63%	0.82%
Relied on wider family support	1.16%	0.94%	1.09%
Visited medical facility	1.74%	0.00%	2.72%
Spiritual response	2.91%	4.72%	5.72%
Other	6.69%	2.20%	7.36%
Did nothing	31.69%	51.57%	39.24%

*** significant at 1%, ** significant at 5%, * significant at 10%

Table 37 reveals that although the first and second response for male-headed and female-headed households were the same; did nothing and spent savings. The third most common response was different for the two types of households. For male-headed households casual labour/worked more was the third most common response in 2011 and 2012, in 2013 the response shifted to others. For female-headed households, casual labour/worked more was the most common response in 2011, in 2011 and 2013, the response shifted to the spiritual response.

Table 37: Distribution of Responses to Shocks Experienced by Gender of Household Head

		2011	2012	2013
Borrowed money	MHH	4.50%	0.42%	3.33%
	FHH	7.38%	2.44%	3.87%
Spent savings	MHH	22.07%	25.85%	26.67%
	FHH	18.85%	13.41%	10.32%
Sold livestock	MHH	2.70%	1.27%	1.90%
	FHH	4.10%	4.88%	5.81%
Sold more crops	MHH	6.31%	0.42%	5.71%
	FHH	4.10%	2.44%	2.58%
Casual labour/worked more	MHH	10.81%	10.59%	5.71%
	FHH	14.75%	3.66%	5.81%
Reduced food consumption/Consumed less preferred food	MHH	5.86%	1.27%	2.86%
	FHH	4.92%	3.66%	3.23%
Reduced non-food expenditures	MHH	0.90%	3.39%	3.81%
	FHH	1.64%	0.00%	1.29%
Relied on support from NGO/Church/Govt	MHH	1.80%	0.42%	0.00%
	FHH	1.64%	1.22%	1.94%
Relied on wider family support	MHH	0.00%	0.00%	0.48%
	FHH	3.28%	3.66%	1.94%
Visited medical facility	MHH	2.25%	0.00%	2.86%
	FHH	0.82%	0.00%	2.58%
Spiritual response	MHH	2.70%	4.24%	2.86%
	FHH	3.28%	6.10%	9.68%
Other	MHH	6.76%	0.85%	8.10%
	FHH	6.56%	6.10%	6.45%
Did nothing	MHH	33.33%	51.27%	35.71%
	FHH	28.69%	52.44%	44.52%

*** significant at 1%, ** significant at 5%, * significant at 10%

Household Decision Making around Crop Production, Sales & Consumption

Questionnaire participants were asked each year which is involved in the decision making around; crop production, crop sales, crop consumption, livestock sales and the management of savings and small-scale enterprises. There were four possible responses; male household member-only, female household member-only, joint decision making and other household members. The desired trend would be for male-headed households to have a greater level of joint decision making, as opposed to male-only decision making. This may indicate more equal gender dynamics within households.

Table 38 shows the household decision making related to crop production in 2013 for the five main crops produced. As expected, decisions in female-headed households are predominately made by female members, with cash crops and maize mainly involving joint decision making or other household members.

Male-headed households show more variety in the type of decision making. Male household members are making most of the decision for all crops ranging from 42 per cent for soya to 62 per cent for tobacco. Joint decision making was the second most common type reported by male-headed households, ranging from 33 per cent for cotton to 44 per cent for soya. The instances for female only decision making was low, ranging from 0 per cent for tobacco, 4 per cent for maize, 6 per cent for groundnut, to the highest of 14 per cent for soya. The relatively higher level of female or joint decision making around soya production is interesting; this is explored more in the crop sales and consumption tables.

In 2013, during female only focus group discussions women were asked about who is involved in crop production from the initial stage of clearing the plot to the post-harvest processing and sales. Across the three FGDs in Salima, Lilongwe and Mchinji, there was an initial consensus that all household members take part in all the crop production activities. However, in the Mchinji FGD, one woman disagreed saying that her husband always comes late, and she does most of the work, with another reporting how she does not have a husband, so she does all the work herself. Similarly, in Salima, after some discussion the participants agreed that most of the work is done by women and children, whereas men come late when most of the work is done. The women in Salima went into more detail around the division of labour, saying that men do not dig groundnuts (i.e. harvesting), clear the land, or weed, as this is seen as work for women and children. One woman went as far as to say that '*the man will take care of the sales even though he didn't cultivate the land*', something which the group agreed is becoming more common as groundnuts become a cash crop; before it was a crop that women had more control over.

Table 38: Household Decision Making Related to Crop Production in 2013

		Maize	Groundnut	Soya	Tobacco	Cotton
MHH	Male household member	61%	60%	42%	62%	61%
	Female household member	4%	6%	14%	0%	6%
	Joint decision making	35%	34%	44%	38%	33%
	Other household member(s)	0%	0%	0%	0%	0%
FHH	Male household member	0%	0%	0%	0%	0%
	Female household member	92%	97%	100%	88%	86%
	Joint decision making	8%	3%	0%	0%	14%
	Other household member(s)	0%	0%	0%	13%	0%

When it came to crop sales, a pattern similar to that of crop production emerged (Table 39). For female-headed households, the vast majority of decisions around the sale of maize, groundnuts and soya were made by female household members. There was more involvement of male-headed and other household members in decisions around the sale of tobacco and cotton. This difference for the two cash crops is likely due to the perceived higher value of these crops and the need to send the product to auction floors and central trading points.

For male-headed households decisions around the crop, sales were largely dominated by male members, ranging from 44 per cent of the households for soya to 69 per cent of households for tobacco. Crop sale decisions were made jointly for approximately a third of households, ranging between 28 per cent of households for cotton, to 44 per cent of households for soya. Soya sale decisions appear to have been the most inclusive, with 11 per cent of households with female-only decision making and 44 per cent of households with joint decision making.

Table 39: Household Decision Making Related to Crop Sales in 2013

		Maize	Groundnut	Soya	Tobacco	Cotton
MHH	Male household member	60%	61%	44%	69%	67%
	Female household member	4%	5%	11%	0%	6%
	Joint decision making	36%	34%	44%	31%	28%
	Other household member(s)	0%	0%	0%	0%	0%
FHH	Male household member	0%	0%	0%	0%	0%
	Female household member	95%	97%	100%	75%	86%
	Joint decision making	5%	3%	0%	13%	0%
	Other household member(s)	0%	0%	0%	13%	14%

Only three crops were considered for decision making around consumption, given the nature of tobacco and cotton (Table 40). For male-headed households, male members made most of the decisions in relation to consumption of crops, ranging from 42 per cent of households for soya to 59 per cent of households for both maize and groundnut. Again, like crop sales, a little over a third of households had joint decision making when it came to crop consumption, ranging from 34 per cent of households for groundnuts to 39 per cent of households for soya. Again, for a relatively larger proportion of households, soya seems to be under the control of female household members, with 19 per cent of households reporting that female members made decisions around the consumption of the crop.

For female-headed households, most decisions around the consumption of crops were made by female members, ranging between 96 per cent of households for maize and 100 per cent of households for soya. Only 4 per cent of female-headed households reported joint decision making in relation to maize consumption, with 2 per cent of households reporting such for groundnut.

Table 40: Household Decision Making Related to Crop Consumption in 2013

		Maize	Groundnut	Soya
MHH	Male household member	59%	59%	42%
	Female household member	3%	7%	19%
	Joint decision making	37%	34%	39%
	Other household member(s)	0%	0%	0%
FHH	Male household member	0%	0%	0%
	Female household member	96%	98%	100%
	Joint decision making	4%	2%	0%
	Other household member(s)	0%	0%	0%

Household Decision Making around Livestock Sales

Considering how important livestock is as an asset, looking at how decisions are made in relation to its disposal gives a good insight into how such resources are controlled. For male-headed households, male members dominated the decision-making process for all livestock sales. However, for chickens, there was a relatively larger percentage, 24 per cent of households, with female-only decision making. There were no instances of joint decision making or decision made by other household members for livestock sales.

Female members made all the decisions around the sale of chickens in female-headed households. Small percentages of female-headed households reported that other members made decisions in relation to the sale of goat and pig, 4 per cent and 10 per cent respectively. There was only one female-headed household reporting the sale of cattle; therefore, this was not included in the analysis.

Table 41: Household Decision Making Related to Livestock Sales in 2013

		Chicken	Goat	Pig	Cattle
MHH	Male household member	76%	91%	91%	100%
	Female household member	24%	9%	9%	0%
	Joint decision making	0%	0%	0%	0%
	Other household member(s)	0%	0%	0%	0%
FHH	Male household member	0%	0%	0%	-
	Female household member	100%	96%	90%	-
	Joint decision making	0%	0%	0%	-
	Other household member(s)	0%	4%	10%	-

Household Decision Making around Savings and Enterprises

Savings and management of small-scale enterprises were the final two areas that looked at decision making and gender dynamics. Table 42 shows that decision making around savings in male-headed households is predominately made by female members with 52 per cent of households reporting such. This is in comparison to 45 per cent of households reporting that male members made the decisions. It is possible that this is linked to the high prevalence of women's Village Savings and Loans groups that emerged in the study area in 2012 and 2013. For female-headed households, there is a relatively large percentage, 29 per cent of households, reporting that other members (e.g. sons/daughters) made decisions in relation to savings.

There are significant disparities between men and women when it comes to how money is used. An income and expenditure matrix exercise was conducted in the 2013 female only FGD in Mchinji. The women talked freely about how they budget and invest in their crops and other things like children's education, whereas men spend money on alcohol. An older participant explained how *"The woman can get some money from crops or ganyu and wrap it in her chitenje (traditional cloth wrap worn by women) and keep it for fertiliser or for something important".*

Table 42: Household Decision Making Related to Savings in 2013

MHH	Male household member	45%
	Female household member	52%
	Joint decision making	0%
	Other household member(s)	3%
FHH	Male household member	0%
	Female household member	71%
	Joint decision making	0%
	Other household member(s)	29%

Table 43 shows that 60 per cent of male-headed households with an enterprise reported that male members made the decisions in relation to its management, 28 per cent of household reported it was female members, and 12 per cent other household members. For female-headed households, 63 per cent of households reported that female members made decisions in relation to the management of enterprises, with 38 per cent of households reporting other (e.g. sons/daughters).

Table 43: Household Decision Making Related to Small Scale Enterprises in 2013

MHH	Male household member	60%
	Female household member	28%
	Joint decision making	0%
	Other household member(s)	12%
FHH	Male household member	0%
	Female household member	63%
	Joint decision making	0%
	Other household member(s)	38%

Summary

The main aim of this chapter was to describe what assets households utilize to pursue their various livelihood strategies. A thorough investigation of how the ownership and employment of the main household capital assets were employed was presented. This included looking at how the results changed over time and how they differed between male-headed and female-headed household.

There were numerous positive trends over the four years. For instance, the proportion of households reporting experiencing illness in the past month declined from 82.1 per cent in 2010 to 59.5 per cent in 2013. Likely contributing to this was the extremely positive increases in access to safe drinking water. This was largely driven by the increased access to protected wells and hand pumps, which more than doubled from 40 per cent in 2010 to 88 per cent in 2013. Also, it was encouraging to see that access to sanitation, namely latrines, started from a high base of 87 per cent and remained high at 83 per cent in 2013.

More households were likely to own livestock at the end of the study, the percentage of those owning no livestock at all dropped from 30.8 per cent in 2010, to the lowest point of 21.0 per cent in 2012. The income gained from livestock sales appears to have increased substantially with mean values increasing steadily from 9,195 MWK in 2010 to 16,338 MWK in 2013, although this increase was not statistically significant. These results are encouraging as livestock is used as both a means of savings and income.

Another positive trend was the three-fold increase in the number of households saving over the study period, going from 15.1 per cent in 2010 to 46.2 per cent in 2013, the mean amount saved also increased significantly.

However, many trends remained unchanged over the study period, which can in itself be either a positive or negative sign, depending on the context. For instance, the mean land ownership and land cultivated over the four years remained stable over the four years ranging slightly above 1 hectare. This could be interpreted as positive as households are maintaining their access to the land they have available to them. However, the size of the landholdings is relatively restricted, and without the appropriate use of improved crop production technologies, the quality of the soil is likely deteriorating along with the crop productivity.

Similarly, the proportion of households leaving land uncultivated remained stable over the study period. The main reasons attributed to leaving land uncultivated over the four study years were lack of inputs, the suitability of land for cultivation and illness, which was one of the most prevalent reasons for female-headed households.

There was no significant change in the percentage of households accessing credit. However, households were taking out larger loans because the mean amount of credit taken increased significantly over the study period. The main reason for obtaining credit in 2013 was to purchase food for consumption with 30 per cent of households reporting this in comparison to 11 per cent in 2010. This is a concerning trend considering the food bought with this borrowed money is likely bought at this time when food prices are at their peak and with the mean percentage of interest charged in 2013 being 57 per cent.

The analysis showed that crop production was the main livelihood strategy over the course of the study. However, casual labour and non-agricultural enterprises were also important sources at various stages of the seasonal calendar. In response to the question of how have livelihood strategies changed over the last five years (i.e. 2009-2013), focus group participants discussed how crop production is less profitable than it was before as inputs are more expensive and the prices received at the market are poor. The growing popularity of non-agricultural enterprises shows how households, who can invest, are beginning to diversify their income portfolios, although the reliability and impact of these small-scale businesses and casual labour are questionable due to the precarious and seasonal nature of such activities. The number of households gaining an income from paid work fluctuated over the study period with between 36 per cent and 53 per cent engaging in it over the study period. The most common type of paid employment or work reported over the four years was agricultural. Casual agricultural labour, or ‘ganyu’ labour, is the most common type of paid work in rural Malawi, especially for subsistence farming households, and is an important income source often used as a coping strategy. A decline in the prevalence of sorting and packing of tobacco has been replaced with construction.

Over the study period, understandably, maize was by far the predominant crop with most of the sample cultivating it each year. Groundnut was the second most common crop grown, over 75 per cent of households cultivated groundnuts throughout the study. Famers appear to have shifted away from the cultivation of tobacco and cotton and toward increased investment in legumes as both a cash and food crop. For the overall sample, the mean area of allocated to crops remained stable over for all crops despite shifting preferences from tobacco and cotton to legumes.

Despite challenges around maize production, groundnut yields increased significantly over the study period going from 480kg/ha in 2008-09 to 882kg/ha in 2012-13. This increase is likely linked to the groundnut purchasing scheme being implemented in the studied areas. The scheme included the provision of improved seed on credit, training and extension services and the promise of competitive market prices at the end of the season.

Again, likely linked to this was how groundnut was the most common crop sold over the study period showing upward trends in popularity as a cash crop. The mean quantity of groundnuts sold by households in 2008-09 was 122kg, each year this increased, with a significant overall increase to 211kg in the 2011-12 season. The mean amount of the other main crops sold remained largely stable over the study period.

Year on year, there was a significant increase in the total mean amount of income earned from all crop sales. The total mean income earned went from 14,775 MWK in 2008-09 to 43,379 MWK in 2010-11, this increased again to 50,537 MWK in 2011-12.

There was no significant change in the overall mean yields of soya, tobacco or cotton harvested over the study period.

A wide variety of household-level shocks were reported each year which provided an insight into the levels of risk and vulnerability. The three most common, and consistently reported, three shocks were lower crop yields due to drought or floods, illness or accident involving a household, death of a household member. Undoubtedly the occurrence of these shocks is strongly influenced by seasonality. Most household shocks occur between January and May, during the lean season. Every year the occurrence of shocks drop-off in July, harvest time, but begin to steadily increase later in the year. Every year the most common response was to do nothing; a reflection of the capacity of households to respond during the lean season. Many households reported they were unable to do anything because they had no resources, lacked labour or they felt that the shock was outside of their control (e.g. failed rains). The other most common responses included spending savings, which shows the important role savings play in buffering the impact shocks experienced, turning to casual labour or to work more.

Another aspect of vulnerability explored in this chapter was gender inequality. The results that emerged not only gave insight into the gendered differences in the studied area but also highlighted the importance of ensuring a gender lens is applied to data analysis. As highlighted by the recent study by Ragasa, Aberman and Mingote (2019), the connections between gender and livelihood outcomes, like food security are complex, but undoubtedly profound, signalling the importance of analysing gendered pathways. A large proportion of the sample was female-headed, this proportion increased significantly from 35 per cent in 2010 to 41 per cent in 2013. This is a concerning trend considering the mean dependency ratio showed that female-headed households have less economically active household members available in comparison to male-headed households.

Female-headed households faired significantly worse off than male-headed households across a variety of important variables. For instance, they had a significantly worse mean illness score in 2012 and 2013. In all study rounds, apart from

2010, they both owned and cultivated a significantly smaller area of land. Year on year, female-headed households earned less than male-headed households from livestock sales. Every year male-headed households had saved and credited more money than female-headed households and in general, were more likely to have access to savings.

However, an interesting trend was the overall increase in the percentage of households accessing savings can be linked to the emergence of the 'Village Savings and Loans' groups (VSLs). In 2013, 68 per cent of savings were kept in VSLs. During focus group discussions participants referred to the appointment of the first female president Joyce Banda and her political party who encouraged people, especially women, to set up their own village savings and loans groups. Discussions with study participants around this topic often included how many women wanted to start up their own small business. This correlates with the difference in the proportion of female-headed households reporting using VSLs in comparison to male-headed households. In 2013 the difference continued, 86 per cent of female-headed households used VSLs in comparison to 60 per cent of male-headed households.

Although there were no significant differences in what crops male-headed households chose to cultivate in comparison to female-headed households, over the study period, there were a number of times when male-headed households were able to cultivate significantly larger area of crops in comparison to female-headed households, for example for maize in 2012-13, for groundnut in 2011-12, for tobacco in 2012-13.

Maize yields showed signs of decline over the study period, especially for female-headed households, and were at their worst in the final study round 2012-13 which was attributed to poor weather, 'extremely high' fertiliser prices, and the price of maize grain during the lean season was more than double the 2012 prices (FEWSNET, 2013).

Unlike maize, there were no significant differences in groundnut yields achieved by male-headed households in comparison to female. However, a finding relevant for the groundnut purchasing scheme was how in all year's male-headed households sold more groundnuts than female-headed households, but this was only significant in

2008-09. Although each year male-headed households earned a greater mean income from crop sales in comparison to female-headed households, only in 2008-09 was this difference significant.

Considering that women are primarily responsible for feeding and care in the household, along with many other household tasks, logically their role and influence in decision making should be considered, however, this is not the case. As (Ragasa, Aberman and Mingote (2019) highlighted, numerous studies have shown how this aspect of inequality negatively affects the adoption of agricultural technologies, agricultural productivities, income generation and food security (Udry *et al.*, 1995; Doss, 2001; Meinzen-Dick *et al.*, 2010; Ibnouf, 2011; Fisher and Kandiwa, 2014; Kilic *et al.*, 2015; Meijer *et al.*, 2015). For male-headed households decision making around crop production, sales, and consumption were largely dominated by male members, after that joint decision making was most common, then it was female decision making alone. Decisions around soya appear to have been the most inclusive or female-driven. For female-headed households, the vast majority of decisions around the production, sale and consumption of maize, groundnuts and soya were made by female household members. There was more involvement of male-headed and other household members in decisions around the sale of tobacco and cotton. This difference for the two cash crops is likely due to the perceived higher value of these crops and the need to send the product to auction floors and central trading points, an observation also made by Ragasa, Aberman and Mingote (2019).

For male-headed households, male members dominated the decision-making process for all livestock sales. However, for chickens, there was a relatively larger percentage, 24 per cent of households, with female-only decision making. Female members made all the decisions around the sale of chickens in female-headed households. Small percentages of female-headed households reported that other members made decisions in relation to the sale of goat and pig. Decision making around savings in male-headed households is predominately made by female members with 52 per cent of households reporting such.

Chapter 6: Food Security & Asset Ownership over Time

The main aim of the study is to provide substantial insight into how different livelihood components and supports provided, influence key indicators of food security and livelihood change.

Food security is determined by a complex set of factors. Closely linked to food security is how households accumulate, utilize and dispose of key capital assets. Depending on the context, various livelihood system components have the potential to improve the food security and asset accumulation of households. Conversely, some components of the livelihood system could also have a negative effect.

In this chapter, households' access to food and ownership of key livelihood capital assets is explored. Descriptive statistics are used to present the food availability, consumption patterns and assets ownership over the study period. This is presented for the overall sample and by gender of the household head. The three main dependent variables employed are the Household Asset Score, Household Food Insecurity Access Scale (HFIAS) and Household Dietary Diversity Score (HDDS). These variables are explained in greater detail in chapter four.

This chapter first presents the key components of the three dependent variables using descriptive statistics and significance tests, between groups and over time. Secondly, a comparison of all three variables is presented to show how each of the three variables correlated with each other over the four years. Following this, the household assets score variable is used to categorise the sample into proxy wealth groups to allow for the investigation of food security by levels of asset ownership. Finally, correlation and multiple regression estimates of factors related and influencing the food security and asset ownership variables are explored.

Household Asset Score

As outlined in chapter four, the household asset score is a non-monetary variable designed as a proxy for household wealth using data on ownership of key household assets. The assets selected for the household asset score were identified through participatory wealth ranking exercises conducted each year in all study locations. The assets considered in the calculation of the household asset score include; the quantity of land owned, the quantity of livestock owned, type of dwelling roof and walls, type of lighting and toilet. The mean household asset score was 15.14 in 2010 this decreased slightly to 14.94 in 2011, then increased to the highest point of 15.84 in 2012, and then decreased to the lowest point 14.62 in 2013 (Table 44). These marginal changes over the study period were not significant (Friedman Test; p=0.066).

Each year male-headed households achieved higher asset scores in comparison to female-headed households; however, these differences were only statistically significant in 2011 and 2013 (Mann Whitney U test; 2010 p=0.066; 2011 p=0.003; 2012 p=0.095; 2013 p=0.000) (Table 44). Although the overall mean household asset score decreased from the first round to the final round, the mean for male-headed households increased from 15.24 in 2010 to 16.30 in 2013, whereas female-headed households saw a decrease from 14.96 to 12.16. Indicating that male-headed household livelihood status improved over the study period in comparison to female-headed households.

Table 44: Mean Household Asset Score

	2010	2011	2012	2013
MHH	15.24*	16.38***	16.56*	16.30***
FHH	14.96*	12.20***	13.95*	12.16***
Overall	15.14*	14.94*	15.84*	14.62*

*** significant at 1%, ** significant at 5%, * significant at 10%

The distribution of households and their asset score are presented in Figure 30 in histogram format. The overall distribution of households remains largely unchanged over the four years with most households falling between 5 and 15.

Table 45 explores the distribution of the sample by quartiles. For each year each household was assigned to one of four groups (Q1, Q2, Q3, Q4) based on where their household assets score fell between the assets score range which was divided into quarters. The highest percentage of households always fell into the lowest quartile (Q1), which can be considered as those with the lowest livelihood level, this increased significantly from 48.2 per cent in 2012 to 56.9 per cent in 2013. A comparative proportion of households fall into Q2 each also; however, this did not change significantly over the study period (p-values presented in Annexe 1: Statistical Tables, Table 86). Q3 and Q4 represent the minority of the sample that would have higher levels of asset ownership; the percentages of households falling into these two groups did not change significantly over the study period.

Following the overall mean asset score trend (Table 44), every year there was a higher proportion of female-headed households falling into the lowest quartile (Q1). However, in 2011 and 2013 this was statistically significant, in 2011 60.0 per cent of female-headed households in comparison to 40.8 per cent of male-headed households, 72.2 per cent and 46.6 per cent respectively in 2013, indicating that female-headed households were worse off in terms of asset ownership in 2011 and 2013 (Table 45) (p-values presented in Annex 2, Table 87).

Table 45: Percentage of Households by Assets Score Quartile

		2010	2011	2012	2013
Q1	MHH	44.4%*	40.8%**	45.5%	46.6%***
	FHH	58.0%*	60.0%**	55.8%	72.2%***
	Overall	49.2%	47.2%	48.2%**	56.9%**
Q2	MHH	42.1%	35.4%	34.3%	37.9%***
	FHH	30.4%	36.9%	36.5%	19.0%***
	Overall	37.9%	35.9%	34.9%	30.3%
Q3	MHH	6.3%	13.8%***	9.1%	7.8%
	FHH	2.9%	0.0%***	3.8%	6.3%
	Overall	5.1%	9.2%	7.7%	7.2%
Q4	MHH	4.0%	5.4%	7.7%	6.0%
	FHH	7.2%	3.1%	3.8%	1.3%
	Overall	5.1%	4.6%	6.7%	4.1%

*** significant at 1%, ** significant at 5%, * significant at 10%

Figure 30: Distribution of Household Asset Scores over the Study Period

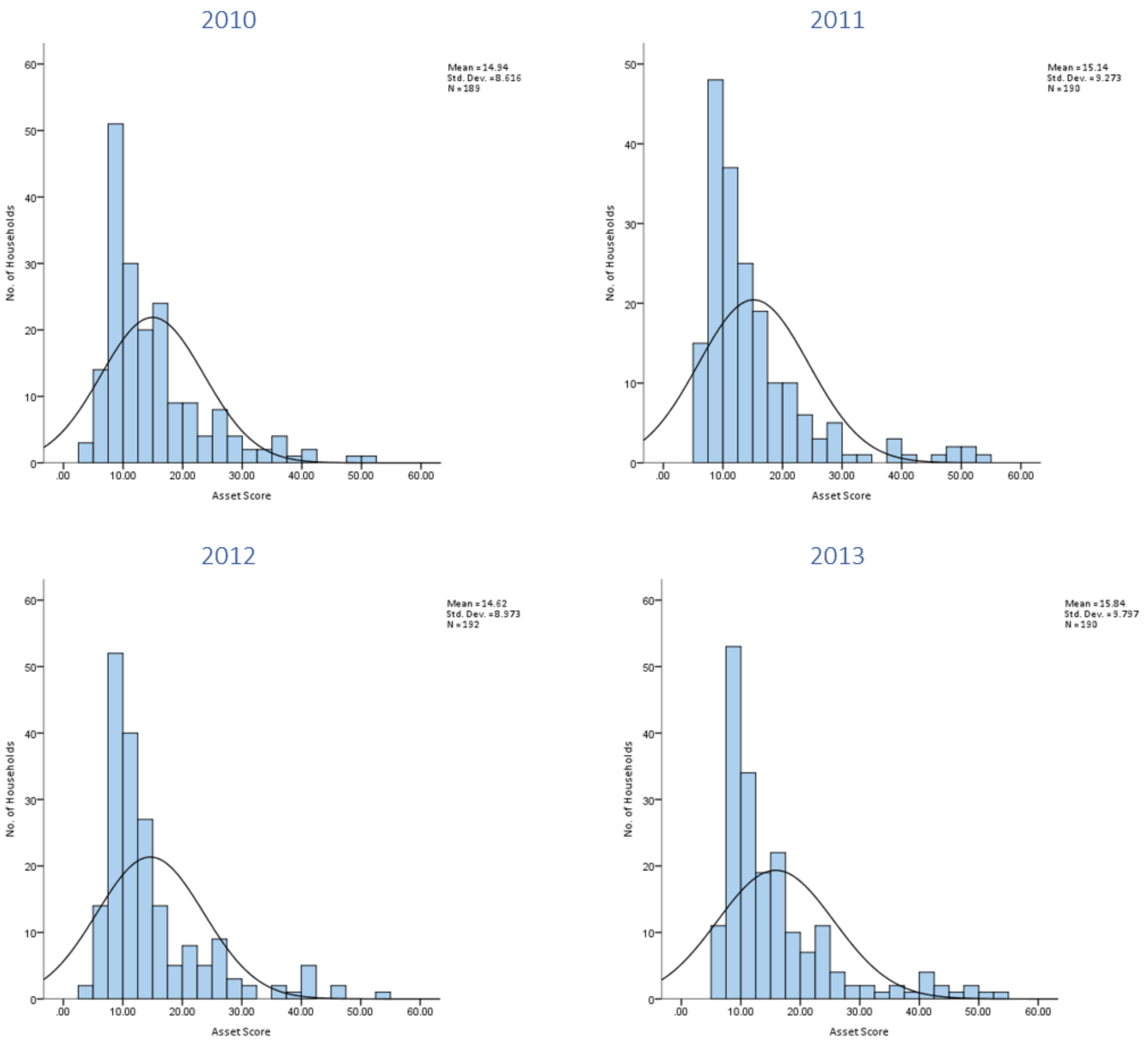


Table 46 shows the percentage of the household that moved up or down in their quartile position, or if they had no movement at all. Results show the change that occurred between years and the overall cumulative change over the four years. Although there is 27.2 per cent of households, which increased their overall positioning, the exact same percentage decreased in their position, whilst 45.6 per cent saw no change in their position. This gives more insight into how, despite there being considerable variability in asset ownership at the household level, this is not significant enough to impact on larger more substantial change.

Table 46: Household Asset Score Quartile Trajectories

	2010 vs. 2011	2011 vs. 2012	2012 vs. 2013	Overall Change
Increased quartile position	30.3%	22.6%	13.8%	27.2%
Decreased quartile position	27.2%	22.6%	26.2%	27.2%
No change in position	42.6%	54.9%	60.0%	45.6%

Household Food Insecurity Access Scale (HFIAS)

The Household Food Insecurity Access Scale (HFIAS) indicates the level of food security based on the experience of the household in the proceeding four weeks. The first component of the HFIAS analysis provides a mean score which can range from 0 to 27, the higher the score, the more food insecure the household.

The mean HFIAS score in 2010 was 10.42; note the 2010 data collection took place in April when households were just emerging from the lean season (Table 47). The mean scores for 2011, 2012 and 2013 are significantly different, ranging from 5.80, 6.08, to 5.94, respectively (Table 47). Although the 2010 result is not directly comparable to the other results given the time of the data collection, it is understandable that there is a significant difference between 2010 and all other years (One-way repeated measures; 2010 vs 2011 p=0.000; 2011 vs 2012 p=0.000; 2010 vs 2013 p=0.000) (Table 47). However, the differences between 2011, 2012 and 2013 are not statistically significant (One-way repeated measures; 2011 vs. 2012 p=1.000; 2011 vs. 2013 p=1.000; 2012 vs. 2013 p=1.000) (Table 47).

In all year’s female-headed households had a higher mean HFIAS score. In 2013, this difference was statistically significant; female-headed households had a mean score of 7.62 in comparison to 4.80 for male-headed households (Independent samples t-test; 2010 p=0.311; 2011 p=0.077; 2012 p=0.060; 2013 p=0.012) (Table 47). This correlates with results from Chapter 5, which show that 2013 maize harvests were at their lowest and significantly so for female-headed households.

Table 47: Mean HFIAS Score

	2010	2011	2012	2013
MHH	10.11	5.31*	5.55*	4.80**
FHH	10.99	6.78*	7.54*	7.62**
Overall	10.42***	5.80***	6.08***	5.94***

*** significant at 1%, ** significant at 5%, * significant at 10%

Following the HFIAS guidance developed by Coates et al., (2007) households have been categorized into four levels of food insecurity: food secure, mildly food insecure, moderately food insecure and severely food insecure. Households are categorized as having a greater level of food insecurity as they respond affirmatively to more severe conditions and/or experience those conditions more frequently.

Again, the seasonal difference between the 2010 data collection and the other years is evident in Table 48. The lowest percentage of households falling into the 'Food Secure' category was in 2010 with 9.2 per cent of households. Interestingly however this figure increased positively from 25.1 per cent in 2011 to 42.1 per cent in 2013 (McNemar's test; 2010 vs. 2011 p=0.000; 2011 vs. 2012 p=0.075; 2012 vs. 2013 p=0.076; 2010 vs. 2013 p=0.000) (Table 48). Each year the proportion of male-headed households that fell into the 'food secure' category was greater than the proportion of female-headed households, however, in no year was this statistically significant (Chi-square test; 2010 p=0.333; 2011 p=0.179; 2012 p=0.161; 2013 p=0.272) (Table 48).

Similarly, the category on the opposite end of the scale, 'severely food insecure' decreased, also a positive indication of the food security situation. In 2010 there was 53.8 per cent of households that fell into the 'severely food insecure' category. In the comparable years the percentage decreased from 35.9 per cent to 33.3 per cent and again to 30.8 per cent (One-way repeated measures; 2010 vs. 2011 p=0.006; 2011 vs.

2012 p=0.878; 2012 vs. 2013 p=0.000; 2010 vs. 2013 p=0.005) (Table 48) (Table 48). In 2011, 2012 and 2013 there was a higher proportion of female-headed households in the 'severely food insecure' category, in 2013 this was statistically significant with 39.2 per cent for female-headed households in comparison to 25.0 per cent of male-headed households (Chi-square test; 2010 p=0.917; 2011 p=0.187; 2012 p=0.277; 2013 p=0.050) (Table 48).

The mildly and moderately food insecure categories appear to show similar trends that indicate that households moved more into the 'food secure' category over the study period (Table 48).

Table 48: Percentage Distribution of Households by HFIAS Category

		2010	2011	2012	2013
Food Secure	MHH	11.1%	28.5%	37.1%	45.7%
	FHH	5.5%	18.5%	25.0%	36.7%
	Overall	9.2%***,***	25.1%***	33.8%*	42.1%*,***
Mildly Food Insecure	MHH	3.2%	13.8%	15.4%	14.7%
	FHH	5.8%	7.7%	5.8%	10.1%
	Overall	4.1%***	11.8%	12.8%	12.8%***
Moderately Food Insecure	MHH	32.5%	25.4%	16.8%	15.5%
	FHH	33.3%	30.8%	28.8%	15.2%
	Overall	32.8%***	27.2%	20.0%	15.4%***
Severely Food Insecure	MHH	53.2%	32.3%	30.8%	25.0%**
	FHH	55.1%	43.1%	40.4%	39.2%**
	Overall	53.8%***	35.9%***	33.3%***	30.8%***

*** significant at 1%, ** significant at 5%, * significant at 10%

Household Diet Diversity Score (HDDS)

The Household Dietary Diversity Score (HDDS) is based on households; responses to question about the types of food they consumed in the past seven days. Household dietary diversity is strongly influenced by seasonality, like many other food security indicators with a relatively shorter recall period, due to the availability of foods during the lean season in comparison to post-harvest. Therefore the 2010 mean HDDS of 4.74, which represents the status of household's dietary diversity in March (i.e. pre-harvest) in comparison to 2011, 2012, 2013, where the HDDS was much higher at 8.24, 8.48 and 8.29 respectively, which represents the status of household's dietary diversity in June/July (i.e. post-harvest). As expected, the difference between 2010 and all other years is statistically significant, however, the differences between 2011, 2012 and 2013 were not statistically significant (One-way repeated measures; Overall 0.000; 2010 vs. 2011 0.000; 2010 vs. 2012 p=0.000; 2010 vs. 2013 p=0.000; 2011 vs. 2012 p=-0.677; 2011 vs. 2013 p=-0.546; 2012 vs. 2013 p=1.000).

In all years, except 2010, male-headed households had a greater dietary diversity score, that was statistically significant, in comparison to female-headed households (Independent t-tests; 2010 p=0.053; 2011 p=0.004; 2012 p=0.000; 2013 p=0.006).

Table 49: Mean Household Dietary Diversity Score (HDDS)

	2010	2011	2012	2013
MHH	4.91*	8.54***	8.76***	8.64***
FHH	4.42*	7.63***	7.69***	7.78***
Overall	4.74***	8.24***	8.48***	8.29***

*** significant at 1%, ** significant at 5%, * significant at 10%

Table 50 shows the food group's households were consuming over the study period. There were only two food groups that were consistently consumed over the study period: cereals and the spices, condiments and beverages group. Consumption of all other food groups was much lower in 2010 (i.e. pre-harvest) in comparison to all other years (i.e. post-harvest). Although not a direct pre/post-harvest comparison with the other three years, the results do provide an insight into the differences in food available at different times of the year.

Table 50: Percentage of Households Consuming Each HDDS Food Group

	2010	2011	2012	2013
Cereals	98.5%	100.0%	100.0%	100.0%
Roots and Tubers	10.8%***,***	81.5%***	95.4%	91.3%***
Vegetables	97.9%	98.5%	98.5%	98.5%
Fruits	26.2%***,***	56.4%***	55.9%	53.3%***
Meat and Meat Products	10.3%***	49.2%***	51.3%	51.3%***
Egg	2.6%***	26.7%**	37.4%**	31.8%***
Fish	16.4%***	68.2%***	72.3%***	57.4%***
Pulses	42.4%	100.0%	95.9%**	89.7%**
Milk and Milk Products	6.7%***	19.5%***	14.4%**,	23.6%**,***
Oils and Fats	28.7%***	48.2%***	44.6%***	64.1%***
Sweets	36.4%***	75.9%	82.6%	74.9%***
Spices, Condiments and Beverages	96.9%	99.5%	99.5%***	94.9%***

*** significant at 1%, ** significant at 5%, * significant at 10%

Table 88 in Annex 2 gives the p-values from the McNemar's test for significance of differences in means over time, with significant values highlighted in grey in Table 50. As expected, most 2010 figures were significantly different from other years. However, some results of interest include the declines in households reporting consumption of egg, fish, pulses, from 2012 and 2013, but in contrast, milk and milk products and oils and fats increased (Table 50). As already established the 2013 maize harvest was significantly lower in 2013, indicating a poor harvest at a time of national economic strain. Thus households' ability to purchase animal protein and cooking oil appear to be more restricted in comparison to 2011 and 2012.

Following on from the finding that in three of the four study years female-headed households had a significantly lower mean HDDS in comparison to male-headed households, Table 51 shows the difference between the percentages of male-headed households consuming each food group in comparison to female-headed households. The resulting p-values from Chi-square tests are presented in Table 89.

In 2011, 2012 and 2013 male-headed households were more likely to have consumed meat and meat products in comparison to female-headed households. Similarly, in 2012 and 2013, male-headed households were more likely to have consumed eggs in comparison to female-headed households. These two differences suggest that male-headed have more access to animal proteins in comparison to female-headed households.

Other significant gendered differences worth highlighting include the 2011 difference in the percentage of male-headed households consuming fish, oils and fats in comparison to female-headed households. Also, in 2012, the differences in the percentage of male-headed households consuming roots and tubers, and fruits in comparison to female-headed households.

Table 51: Percentage of Households Consuming Each HDDS Food Group By Gender of Household Head

		2010	2011	2012	2013
Cereals	MHH	99.2%	100.0%	100.0%	99.1%
	FHH	97.1%	100.0%	100.0%	97.5%
Roots and Tubers	MHH	11.9%	83.1%	97.9%	93.1%
	FHH	8.7%	78.5%	88.5%	88.6%
Vegetables	MHH	96.8%	99.2%	97.9%	99.1%
	FHH	100.0%	96.9%	100.0%	97.5%
Fruits	MHH	30.2%	56.2%	60.8%	56.9%
	FHH	18.8%	56.9%	42.3%	48.1%
Meat and Meat Products	MHH	11.9%	55.4%	58.7%	59.5%
	FHH	7.2%	36.9%	30.8%	39.2%
Egg	MHH	2.4%	30.8%	42.0%	40.5%
	FHH	2.9%	18.5%	25.0%	19.0%
Fish	MHH	20.6%	73.8%	74.1%	62.1%
	FHH	8.7%	56.9%	67.3%	50.6%
Pulses	MHH	41.3%	100.0%	95.8%	89.7%
	FHH	44.9%	100.0%	96.2%	89.9%
Milk and Milk Products	MHH	8.7%	22.3%	16.8%	24.1%
	FHH	2.9%	13.8%	7.7%	22.8%
Oils and Fats	MHH	29.4%	54.6%	46.9%	66.4%
	FHH	27.5%	35.4%	38.5%	60.8%
Sweets	MHH	41.6%	78.5%	85.3%	75.9%
	FHH	27.5%	70.8%	75.0%	93.4%
Spices, Condiments and Beverages	MHH	97.6%	100.0%	100.0%	97.4%
	FHH	95.7%	98.5%	98.1%	91.1%

*** significant at 1%, ** significant at 5%, * significant at 10%

Differences in Household Food Security Outcomes by Asset Ownership

By disaggregating the food security variables by the four asset score quartiles a pattern of the mean HFIAS and HDDS scores in the higher quartiles have greater levels of food security, particularly in 2012 and 2013.

The HFIAS the higher asset score quartile, the better the mean HFIAS score. From 2011 to 2013 these differences were significant (One-way between-groups ANOVA test; 2010 p=0.568; 2011 p=0.011; 2012 p=0.009; 2013 p=0.031) (Table 52). So much so that in 2013, the worst year for food security, the mean HFIAS for those in Q1 was 7.23 in comparisons to 1.75 for those in Q4, the lowest HFIAS score in any year, in any quartile. This trend is mirrored with the HDDS (One-way between-groups ANOVA test; 2010 p=0.790; 2011 p=0.054; 2012 p=0.000; 2013 p=0.001) (Table 52). When looking solely at households in Q4, over the study period, both their HFIAS and HDDS decreased steadily. For HFIAS in 2011, they achieved a mean of 4.44, and this decreased to 3.31 in 2012 and 1.75 in 2013. Likewise, for Q4 HDDS in 2011, they achieved a mean score of 8.89, this increased to 9.69 in 2012 and 10.38 in 2013 (Table 52). This leads to the assumption that there is a relationship between household asset ownership and food security outcomes – households with greater levels of asset ownership are more food secure.

Table 52: Mean HFIAS Score and HDDS Score by Asset Score Quartile

		2010	2011	2012	2013
HIFAS	Q1	10.79	7.13**	7.43***	7.23**
	Q2	9.92	5.20**	5.56***	4.49**
	Q3	11.70	3.11**	2.47***	5.29**
	Q4	9.00	4.44**	3.31***	1.75**
HDDS	Q1	4.82	7.82*	7.82***	7.85***
	Q2	4.58	8.36*	8.94***	8.61***
	Q3	4.90	9.06*	8.87***	9.14***
	Q4	4.90	8.89*	9.69***	10.38***

*** significant at 1%, ** significant at 5%, * significant at 10%

Comparison of Food Security Status & Asset Scores Overtime

The food security and asset score results presented so far show that there is between year variance in results. There also appears to be a relationship between households' food security and asset ownership. In this section, the consistency and validity of the two food security variables and household asset score variable are investigated by looking at how these variables correlate with each other and how this varies each year. The chosen variables measure different household characteristics of food security and wellbeing (Maxwell and Cotes, 2014; Kennedy et al., 2014; Kahsay, 2017).

Table 53 shows the results of Spearman's rho correlation analysis, which was used to analyse the relationship between the three dependent variables. Spearman rho correlation was chosen as it is proven to be a stronger measure than Pearson's correlation for this type of data (Maxwell and Coates, 2014). The correlation coefficients are included in the tables below, the closer the correlation coefficient is to 1.00, the stronger the relationship, these instances are highlighted in dark blue (i.e. 0.30 to 1.00). Relatively weaker relationships are highlighted in light blue (i.e. 0.10 to 0.29) (Cohen, 1988, p79-81). Where applicable, the level of significance is also indicated.

In all four years the two food security variables, HFIAS and HDDS, were found to have significant relationships, the strength of these relationships ranged from medium in 2010 and 2011, to small in 2012 and 2013.

When looking at the relationships between the two food security variables and the household asset score variable, the assumption found in the previous section around Table 52 is further strengthened. Apart from 2010, which represents the end of the lean season, in 2011, 2012 and 2013, there were significant relationships between the two food security variables and the household asset score variable. In all three years, the relationship between the HFIAS and the household asset score were of small strength. Whereas, in 2012 and 2013, the relationship between the HDDS and the household asset score were of medium strength (Table 53).

Table 53: Spearman's rho Correlation for Food Security and Asset Score Variables

		HFIAS	HDDS	Asset Score
	HFIAS	1.00	-.386***	-0.08
2010	HDDS	-.386***	1.00	0.05
	Asset Score	-0.08	0.05	1.00
	HFIAS	1.00	-.327***	-.280***
2011	HDDS	-.327***	1.00	.283***
	Asset Score	-.280***	.283***	1.00
	HFIAS	1.00	-.265***	-.254***
2012	HDDS	-.265***	1.00	.378***
	Asset Score	-.254***	.378***	1.00
	HFIAS	1.00	-.185***	-.262***
2013	HDDS	-.185***	1.00	.319***
	Asset Score	-.262***	.319***	1.00

Coefficient strength; small r=.10 to .29, medium r=.30 to .49, large r=.50 to 1.0; *** significant at 1%, ** significant at 5%, * significant at 10%

Livelihood System Factors Influencing Food Security & Asset Ownership

This section uses correlation analysis and an Ordinary Least Squares, multivariate regression models using Ordinary Least Squares, Negative Binomial, and Poisson analysis. The correlation analysis provides an insight into the relationships between the dependent food security and household asset variables and between these and other independent variables found in the studied livelihood system. The various regression models go a step beyond the correlation analysis and attempt to analyse which of the associated independent variables may have influenced the dependant food security and household asset variables over the study period. Like all regression models, this analysis helps uncover significant associations between food security, asset ownership and other livelihood characteristics, but cannot be interpreted as a direct test of causal links (Manlosa *et al.*, 2019).

Livelihood System Factors Influencing Household Asset Ownership

To ensure the most appropriate independent variable was included in the household asset score regression model a Spearman Rho correlation analysis was first run between the asset score variable from the four study years and the main independent variables already explored descriptively in Chapter 5. The results of this analysis are presented in (Table 54). The independent variables that had the strongest significant relationship with the household asset score in all years were land owned and the total value of livestock. These relationships are expected, given that they are two of the four main variables that make up the asset score for households. Household size was the one other variable that had a significant relationship with the asset score for all study years, although at varying levels of strength and significance. After this, other notable relationships include household head sex, household head education, and paid work, each of which had significant relationships with the household asset score for at least three of the four study years.

Several independent variables were found to have inconsistent, weak or non-significant relationships with the asset score variable. These were the household dependency ratio, illness score, number of shocks experiences, enterprise ownership, and groundnut yield. Therefore, these variables were not included in the regression model for further exploration.

Table 55 shows the results from the OLS multivariate regression model with the asset score variables from the four study years. Numerous assumptions were run to ensure the four iterations of the model were valid[12].

Several significantly influential variables were found in the results. Like the trend in the correlation results, land ownership and livestock value had a significant influence on the household asset score. This is due to both making up the composite asset score variable. Other variables that had a statistically significant influence on the asset score in two of the four study years were household education and total crops sold. Other

[12] Linearity was found in all years as assessed by partial regression plots and a plot of studentized residuals against the predicted values. There was independence of residuals, as assessed by a Durbin-Watson statistic of 1.672 for 2010, 2.061 for 2011, 2.023 for 2012 and 2.116 for 2013. There was homoscedasticity, as assessed by visual inspection of plots of studentized residuals versus unstandardized predicted values. There was no evidence of multicollinearity in any year, as assessed by tolerance values greater than 0.1 (see **Error! Reference source not found.**). There were no studentized deleted residuals greater than ±3 standard deviations, no leverage values greater than 0.2, and values for Cook's distance above 1. The assumption of normality was met, as assessed by Q-Q Plots for each year. In all years, the multiple regression model statistically significantly predicted the household asset score. 2010: $F(11, 78) = 182.944$, $p=0.000$, adj. $R2 = 0.957$. 2011: $F(13, 60) = 118.613$, $p=0.000$, adj. $R2 = 0.963$. 2012: $F(13, 109) = 213.874$, $p=0.000$, adj. $R2 = 0.958$.

variables that proved significant in at least one of the study years were household head age and paid work.

Variables that did not have an influence on the household asset score include household head sex, which contrasts with all the findings preceding this section whereby there are several significant differences between male-headed and female-headed households around asset ownership. Other variables that did not influence the asset score include household size, access to savings, access to credit and maize yield.

Table 54: Spearman Rho Correlations for Household Asset Score and Independent Variables

	2010		2011		2012		2013	
	Correlation Coefficient	Sig. (2-tailed)	Correlation Coefficient	Sig. (2-tailed)	Correlation Coefficient	Sig. (2-tailed)	Correlation Coefficient	Sig. (2-tailed)
Household Asset Score	1.000	-	1.000	-	1.000	-	1.000	-
District - Lilongwe	-0.109	0.133	-0.053	0.469	-.233***	0.001	-0.130	0.071
District - Mchinji	.176**	0.015	0.134*	0.065	0.078	0.286	0.031	0.669
District - Salima	-0.070	0.338	-0.085	0.243	.160**	0.028	0.102	0.159
Household Head Sex (m/f)	-0.134	0.065	-.218***	0.003	-0.121	0.095	-.274***	0.000
Household Head Age	-	-	0.087	0.236	0.099	0.173	0.070	0.333
Household Head Education	-	-	.206***	0.005	.257***	0.000	.235***	0.001
Household Size	.188***	0.009	.276***	0.000	.203***	0.005	.365***	0.000
Household Dependency Ratio	-	-	-0.139*	0.059	-0.110	0.134	-.233***	0.001
Illness Score	0.010	0.893	0.135	0.064	-0.047	0.519	-0.027	0.711
Number of Shocks Reported (1-3)	-	-	-.144**	0.048	-0.028	0.705	0.009	0.905
Access to Savings (y/n)	0.019	0.791	0.083	0.258	.281***	0.000	.279***	0.000
Access to Credit (y/n)	0.029	0.689	0.041	0.576	-0.052	0.479	.312***	0.000
Land Owned (ha)	.801***	0.000	.854***	0.000	.722***	0.000	.834***	0.000
Enterprise (y/n)	-0.015	0.841	0.070	0.335	.147**	0.043	0.112	0.122
Paid Work (y/n)	-0.105	0.148	-.158**	0.030	-.239***	0.001	-.190***	0.008
Livestock Total Value (MWK)	.664***	0.000	.665***	0.000	.709***	0.000	.747***	0.000
Total Crops Sold (MWK)	0.093	0.259	-	-	.549***	0.000	.488***	0.000
Maize Yield (kg/ha)	0.144*	0.052	-	-	.316***	0.000	.663***	0.000
Groundnut Yield (kg/ha)	0.147*	0.096	-	-	-0.031	0.704	0.070	0.405

Coefficient strength; small r=.10 to .29, medium r=.30 to .49, large r=.50 to 1.0; *** significant at 1%, ** significant at 5%, * significant at 10%

Table 55: Household Asset Score OLS Multiple Regression

	2010			2011			2012			2013		
	Standardized Coefficients Beta	Standard Errors	Sig.	Standardized Coefficients Beta	Standard Errors	Sig.	Standardized Coefficients Beta	Standard Errors	Sig.	Standardized Coefficients Beta	Standard Errors	Sig.
District - Lilongwe (reference dummy)	***	-	0.015	*	-	0.067	-	-	0.740	**	-	0.023
District - Mchinji	0.003	0.555	0.911	-0.014	0.635	0.674	0.040	0.571	0.118	-0.020	0.704	0.565
District - Salima	0.033	0.602	0.211	-0.002	0.638	0.953	0.019	0.547	0.396	0.057	0.724	0.098
Household Head Sex (m/f)	-0.020	0.478	0.412	0.013	0.505	0.636	-0.036*	0.532	0.095	-0.046	0.643	0.151
Household Head Age	-	-	-	0.008	0.017	0.789	0.055**	0.018	0.011	0.029	0.025	0.359
Household Head Education	-	-	-	0.063**	0.069	0.036	0.068***	0.065	0.003	-0.014	0.083	0.675
Household Size	0.022	0.110	0.371	0.028	0.134	0.341	0.025	0.118	0.227	0.000	0.167	0.998
Access to Savings (y/n)	0.049	0.648	0.044	0.037	0.630	0.244	0.013	0.493	0.550	-0.047	0.594	0.133
Access to Credit (y/n)	-0.033	0.447	0.157	0.026	0.520	0.351	0.000	0.592	0.997	0.055*	0.588	0.077
Land Owned (ha)	0.874***	0.233	0.000	0.907***	0.310	0.000	0.650***	0.305	0.000	0.610***	0.514	0.000
Paid Work (y/n)	-0.008	0.480	0.757	-0.060**	0.465	0.028	-0.001	0.424	0.965	-0.022	0.600	0.463
Livestock Total Value (MWK)	0.371***	0.000	0.000	0.312***	0.000	0.000	0.595***	0.000	0.000	0.379***	0.000	0.000
Total Crops Sold (MWK)	0.053**	0.000	0.048	-	-	-	0.029	0.000	0.210	0.093**	0.000	0.026
Maize Yield (kg/ha)	0.021	0.000	0.395	-	-	-	0.000	0.000	0.983	0.066*	0.000	0.078
Constant	2.317	-	-	2.266	-	-	-0.415	-	-	3.475	-	-
Adjusted R^2	0.957	-	0.000	0.954	-	0.000	0.958	-	0.000	0.916	-	0.000

*** significant at 1%, ** significant at 5%, * significant at 10%

Livelihood System Factors Influencing the Household Food Insecurity Access Scale

Following the same process, as described above for the household asset score, a Spearman Rho's correlation analysis was run to investigate what relationships existed between the main independent variables and the independent HFIAS variable. This analysis then informed the design of the regression model for the HFIAS variable. Table 56 presents the results of the HFIAS correlation analysis. It should be noted again that the HFIAS is calculated by using the sum of weighted responses and can range from 0 and 27 - the higher the score, the more food insecure the household was. Therefore, when the correlation coefficients indicate a negative relationship, this should be interpreted as a positive relationship as the lower the score, the better the food security.

An example of this is total crops sold and savings, which had a significantly negative relationship with the HFIAS in all years (where data was available). Meaning as crops sold or savings increased HFIAS decreased. Conversely, illness score and paid work had a significantly positive relationship with the HFIAS variable in all years. This would indicate that as illness score or paid work (e.g. ganyu labour) increased so did the HFIAS and ultimately, the household food security situation worsened.

Other favourable relationships included household head education and land owned, which both had a significantly negative relationship with the HFIAS in the last three years of the study. The only variable to have no significant relationship with the HFIAS in any study year was the household dependency ratio. Considering this, it was excluded from the regression model whilst all other variable listed in Table 56 were included.

Table 57 presents the results from the negative binomial regression analysis, which was used as an alternative to the OLS regression model, which is limited in its analysis of count variables. Count outcome variables are sometimes log-transformed and analyzed using OLS regression. However, many issues are reported to arise with this approach, including loss of data due to undefined values generated by taking the log of zero (which is undefined), as well as the lack of capacity to model the dispersion

(UCLA, 2019). Negative binomial regression can be used for over-dispersed count data, that is when the conditional variance exceeds the conditional mean, which is the case for the HFIAS variable. In the case of under dispersion, a Poisson regression model would have been used. This model was used to investigate the relative contribution of each of the independent variables to the total variance of the HFIAS variable in the four years. In all years, similar assumptions outlined for the HDDS above were found to be valid for the HFIAS model, and in all years the model statistically significantly predicted the HFIAS.

A small number of variables added statistically significantly to the prediction of HFIAS, however, all negatively, apart from one instance with total crops sold in 2010 (i.e. statistically positive). The others that influenced the HFIAS negatively included the number of shocks reported in 2011 and access to credit in 2011.

Table 56: Spearman Rho Correlations for HFIAS and Independent Variables

	2010		2011		2012		2013	
	Correlation Coefficient	Sig. (2-tailed)	Correlation Coefficient	Sig. (2-tailed)	Correlation Coefficient	Sig. (2-tailed)	Correlation Coefficient	Sig. (2-tailed)
HFIAS	1.000	-	1.000	-	1.000	-	1.000	
District - Lilongwe	0.012	0.865	-.157**	0.029	-.164**	0.022	-.181**	0.011
District - Mchinji	-0.098	0.172	0.133*	0.064	-0.093	0.195	0.103	0.151
District - Salima	0.090	0.211	0.023	0.754	.266***	0.000	0.078	0.276
Household Head Sex (m/f)	0.091	0.207	.155**	0.031	0.120*	0.095	.147**	0.040
Household Head Age	-	-	0.039	0.592	.164**	0.022	.216***	0.002
Household Head Education	-	-	-.282***	0.000	-.180**	0.012	-0.130*	0.069
Household Size	.169**	0.018	-0.077	0.285	0.045	0.532	0.041	0.569
Household Dependency Ratio	-	-	0.046	0.525	0.051	0.482	0.011	0.885
Illness Score	.225***	0.002	.157**	0.029	.350***	0.000	.306***	0.000
Number of Shocks Reported (1-3)	-	-	.264***	0.000	0.027	0.708	.214***	0.003
Access to Savings (y/n)	-.161**	0.024	-0.128*	0.074	-.187***	0.009	-.200***	0.005
Access to Credit (y/n)	.165**	0.021	0.092	0.203	0.038	0.600	0.011	0.877
Land Owned (ha)	0.038	0.610	-.194***	0.007	-.170**	0.019	-.147**	0.046
Enterprise (y/n)	-0.049	0.498	-0.019	0.791	-.244***	0.001	-0.006	0.937
Paid Work (y/n)	0.134*	0.061	.144**	0.045	.355***	0.000	.346***	0.000
Livestock Total Value (MWK)	-0.100	0.250	-.263**	0.002	-0.131	0.106	-.312***	0.000
Total Crops Sold (MWK)	-.328***	0.000	-	-	-.162**	0.042	-.362***	0.000
Maize Yield (kg/ha)	-0.043	0.555	-	-	-.327***	0.000	-.412***	0.000
Groundnut Yield (kg/ha)	0.074	0.395	-	-	-.202**	0.012	-.303***	0.000

Coefficient strength; small r=.10 to .29, medium r=.30 to .49, large r=.50 to 1.0; *** significant at 1%, ** significant at 5%, * significant at 10%

Table 57: HFIAS Negative Binomial Regression Analysis

	2010			2011			2012			2013		
	Exp (B)	Standard Errors	Sig.	Exp (B)	Standard Errors	Sig.	Exp (B)	Standard Errors	Sig.	Exp (B)	Standard Errors	Sig.
District - Salima (reference dummy)	1.000	-	-	1.000	-	-	1.000	-	-	1.000	-	-
District - Lilongwe	0.945	0.209	0.788	0.339***	0.358	0.003	0.403	0.062	0.471	0.3723***	0.417	0.018
District - Mchinji	0.785	0.191	0.205	0.882	0.393	0.749	0.370	0.004	0.348	1.216	0.399	0.623
Household Head Sex (m/f)	0.970	0.154	0.843	0.825	0.282	0.496	0.326	0.659	1.154	0.501*	0.359	0.054
Household Head Age	-	-	-	0.990	0.010	0.305	0.012	0.182	1.016	1.000	0.015	0.999
Household Head Education	-	-	-	0.944	0.041	0.163	0.043	0.992	1.000	0.960	0.044	0.355
Household Size	1.014	0.037	0.715	0.943	0.082	0.471	0.086	0.159	1.129	1.079	0.094	0.421
Illness Score	1.046	0.045	0.316	1.008	0.091	0.926	0.087	0.241	1.107	1.198	0.150	0.228
Number of Shocks Reported (1-3)	-	-	-	1.316***	0.112	0.014	0.150	0.492	1.109	1.182	0.191	0.382
Access to Savings (y/n)	0.6791*	0.210	0.065	0.645	0.393	0.264	0.305	0.373	0.762	0.705	0.320	0.274
Access to Credit (y/n)	1.299*	0.146	0.074	1.775**	0.326	0.079	0.376	0.167	1.683	1.207	0.322	0.559
Land Owned (ha)	1.035	0.045	0.435	0.954	0.167	0.776	0.197	0.972	0.993	0.836	0.317	0.571
Enterprise (y/n)	1.025	0.159	0.876	1.754	0.371	0.130	0.374	0.165	0.595	1.246	0.329	0.503
Paid Work (y/n)	1.035	0.144	0.810	0.794	0.260	0.375	0.278	0.003	2.281	1.385	0.347	0.348
Livestock Total Value (MWK)	1.000	0.000	0.143	1.000	0.000	0.880	0.000	0.320	1.000	1.000	0.000	0.544
Total Crops Sold (MWK)	0.100***	0.000	0.001	-	-	-	0.000	0.496	1.000	1.000	0.000	0.207
Maize Yield (kg/ha)	1.000	0.000	0.385	-	-	-	0.000	0.665	1.000	1.000	0.000	0.381
Groundnut Yield (kg/ha)	1.000	0.000	0.527	-	-	-	0.000	0.078	1.000	1.000	0.000	0.962
Constant	14.225***	0.358	0.000	16.403***	0.800	0.000	1.669	1.027	0.618	5.727	1.063	0.101
Omnibus test	-	-	0.006	-	-	0.010	-	-	0.000	-	-	0.031
Goodness of Fit (value df)			0.275			0.784			1.149			1.347

*** Significant at 1%, ** significant at 5%, * significant at 10%. Based on overdispersion test results, models estimated with a Negative Binomial Regression with a Pearson chi-square parameter estimation. Pearson chi-square test (value df) used as indices of the goodness of fit of the model.

Livelihood System Factors Influencing Household Dietary Diversity

Following on from the household asset score and HFIAS analysis, a Spearman Rho correlation analysis was run for the HDDS and all the main independent variables. The correlation coefficient values and p-values for this analysis are presented in Table 58. For HDDS, the higher the score, the greater the dietary diversity, which is a good indication of the food access component of food security. Positive correlation coefficient relationships would be ideal in the instance of this regression model, unlike the HFIAS model, which was the opposite of this.

Several variables which had favourable positive significant relationships in three of the four study years include household head education, access to savings, land owned, enterprise ownership, total crops sold, and maize yield. In contrast to these positive relationships, one relationship that statistically negative in all years was household head sex, indicating that female-headed households and HDDS have a converse relationship. Similarly, the household head age had a significantly negative relationship with the HDDS in three of the four study years.

Variables that were found to have no significant relationship with HDDS in any years were: household dependency ratio, illness score, number of shocks experienced, paid work and groundnut yield. Considering this, these variables were excluded from the regression model.

Table 59 presents the results of the Poisson regression model for HDDS which was used as an alternative to the OLS regression model, which is limited in its analysis of count variables. Count outcome variables are sometimes log-transformed and analysed using OLS regression. However, many issues are reported to arise with this approach, including loss of data due to undefined values generated by taking the log of zero (which is undefined), as well as the lack of capacity to model the dispersion (UCLA, 2019). Poisson regression is used to predict a dependent variable that consists of count data given one or more independent variables, and that is not over-dispersed, as outlined in the previous section. Numerous assumptions were run to ensure the four iterations of the model were valid[13].

The most influential variable that emerged from the analysis was total crops sold, which significantly predicted the HDDS in 2010 and 2012, and although only significant at a 90 per cent confidence interval in 2012 and 2013 it was moving in that direction. The other notable results were ownership of an enterprise in 2010, household head sex in 2012 and household head education in 2013. Both the results from the regression model and the correlation show the important role that key livelihood assets play in household dietary diversity. The effective use of crop production not only as a source of food, but also a source of income indicates that there is a necessary role of the market in both providing a fair return for produce, and providing a variety of produce to the local population, that will ensure a diverse food supply throughout the year.

[13] Linearity was found in all years as assessed by partial regression plots and a plot of studentized residuals against the predicted values. There was independence of residuals, as assessed by a Durbin-Watson statistic of 2.219 for 2010, 1.950 for 2011, 1.945 for 2012 and 2.005 for 2013. There was homoscedasticity, as assessed by visual inspection of plots of studentized residuals versus unstandardized predicted values. There was no evidence of multicollinearity in any year, as assessed by tolerance values greater than 0.1 (see **Error! Reference source not found.**). There were no studentized deleted residuals greater than ±3 standard deviations, no leverage values greater than 0.2, and values for Cook's distance above 1. The assumption of normality was met, as assessed by Q-Q Plots for each year. In all years, the multiple regression model statistically significantly predicted the HDDS. 2010: $F(11, 88) = 2.513$, $p=0.008$, adj. $R2 = 0.239$. 2011: $F(13, 62) = 3.266$, $p=0.001$, adj. $R2 = 0.282$. 2012: $F(13, 112) = 3.786$, $p=0.000$, adj. $R2 = 0.225$.

Table 58: Spearman Rho Correlations for HDDS and Independent Variables

	2010		2011		2012		2013	
	Correlation Coefficient	Sig. (2-tailed)	Correlation Coefficient	Sig. (2-tailed)	Correlation Coefficient	Sig. (2-tailed)	Correlation Coefficient	Sig. (2-tailed)
HDDS	1.000	-	1.000	-	1.000	-	1.000	
District - Lilongwe	.165**	0.022	.259***	0.000	0.118	0.099	-0.013	0.853
District - Mchinji	-0.115	0.109	-0.100	0.165	-0.100	0.164	-.151**	0.035
District - Salima	-0.049	0.493	-.162**	0.023	-0.017	0.809	.171**	0.017
Household Head Sex (m/f)	-0.118*	0.100	-.199***	0.005	-.256***	0.000	-.183**	0.010
Household Head Age	-	-	-.169**	0.018	-.179**	0.012	-.227***	0.001
Household Head Education	-	-	.309***	0.000	.266***	0.000	.445***	0.000
Household Size	-0.067	0.353	0.111	0.121	.146**	0.041	.217***	0.002
Household Dependency Ratio	-	-	-0.010	0.888	0.036	0.623	0.092	0.207
Illness Score	-0.025	0.724	0.023	0.745	0.003	0.971	-0.025	0.728
Number of Shocks Reported (1-3)	-	-	0.092	0.203	0.026	0.716	-0.022	0.756
Access to Savings (y/n)	0.090	0.209	.309***	0.000	.296***	0.000	.186***	0.009
Access to Credit (y/n)	0.017	0.815	.212***	0.003	.177**	0.013	0.103	0.151
Land Owned (ha)	-0.065	0.376	.251***	0.000	.236***	0.001	.182**	0.013
Enterprise (y/n)	.160**	0.025	.210***	0.003	0.111	0.121	.171**	0.017
Paid Work (y/n)	-0.044	0.542	-0.045	0.534	-0.107	0.136	-0.134	0.061
Livestock Total Value (MWK)	-0.009	0.919	0.109	0.202	.227***	0.005	.288***	0.001
Total Crops Sold (MWK)	.255***	0.001	-	-	.426***	0.000	.381***	0.000
Maize Yield (kg/ha)	.223***	0.002	-	-	.347***	0.000	.297***	0.000
Groundnut Yield (kg/ha)	0.078	0.371	-	-	0.082	0.309	0.097	0.243

Coefficient strength; small r=.10 to .29, medium r=.30 to .49, large r=.50 to 1.0; *** significant at 1%, ** significant at 5%, * significant at 10%

Table 59: HDDS Generalized Poisson Regression Analysis

	2010			2011			2012			2013		
	Exp (B)	Standard Errors	Sig.	Exp (B)	Standard Errors	Sig.	Exp (B)	Standard Errors	Sig.	Exp (B)	Standard Errors	Sig.
District - Salima (reference dummy)	1.000	-	-	1.000	-	-	1.000	-	-	1.000	-	-
District - Lilongwe	1.063	0.090	0.498	1.166***	0.056	0.006	1.049	0.040	0.224	0.964	0.049	0.455
District - Mchinji	1.039	0.092	0.679	1.070	0.058	0.244	0.991	0.038	0.808	0.925	0.049	0.107
Household Head Sex (m/f)	0.908	0.072	0.181	0.963	0.043	0.373	0.927***	0.038	0.044	0.993	0.043	0.876
Household Head Age	-	-	-	0.998	0.001	0.209	0.998	0.001	0.191	1.000	0.002	0.774
Household Head Education	-	-	-	1.002	0.006	0.740	1.006	0.004	0.151	1.021***	0.006	0.000
Household Size	1.004	0.016	0.790	1.010	0.011	0.382	1.000	0.008	0.954	1.006	0.011	0.615
Access to Savings (y/n)	0.893	0.104	0.276	1.082	0.052	0.130	1.053	0.034	0.124	0.959	0.040	0.294
Access to Credit (y/n)	0.926	0.068	0.259	1.008	0.042	0.849	1.072*	0.039	0.072	0.989	0.039	0.785
Land Owned (ha)	0.989	0.025	0.652	1.004	0.026	0.887	1.004	0.019	0.810	1.015	0.034	0.668
Enterprise (y/n)	1.209***	0.072	0.008	0.941	0.053	0.251	0.961	0.037	0.283	1.046	0.041	0.271
Livestock Total Value (MWK)	1.000	0.000	0.416	1.000	0.000	0.392	1.000	0.000	0.658	1.000	0.000	0.299
Total Crops Sold (MWK)	1.000***	0.000	0.003	1.000***	0.000	0.018	1.000*	0.000	0.054	1.000*	0.000	0.066
Maize Yield (kg/ha)	1.000	0.000	0.105	1.000	0.000	0.383	1.000	0.000	0.195	1.000	0.000	0.669
Constant	4.182***	0.155	0.000	7.903***	0.110	0.000	8.529***	0.093	0.000	7.723***	0.115	0.000
Omnibus test	-	-	0.005	-	-	0.000	-	-	0.000	-	-	0.000
Goodness of Fit (value df)			0.519			0.229			0.213			0.307

*** Significant at 1%, ** significant at 5%, * significant at 10%. Based on under dispersion test results, models estimated with a generalized Poisson estimator with a Pearson chi-square parameter estimation. Pearson chi-square test (value df) used as indices of the goodness of fit of the model.

Summary

This chapter dealt with the food security and asset accumulation of households. Three dependent variables were used; these included the household asset score, Household Food Insecurity Access Scale (HFIAS) and Household Dietary Diversity Score (HDDS). By employing descriptive statistics and significance tests, how these variables differed over the study period, by gender, and wealth group was explored. This was followed with correlation tests to investigate how the three dependent variables related to each other over time. Finally, correlation and multivariate regression were used to understand the relationship between the dependent variables and key livelihood system characteristics and which of these characteristics influenced food security and asset ownership over the study period.

The overall household asset score fluctuated marginally, though not significantly over the study period, indicating that there was not a lot of change in the overall livelihood status of the studied sample. Most of the sample fell into the lowest asset quartile, with this percentage increasing to 56.9 per cent in 2013. Every year there was a higher proportion of female-headed households falling into the lowest quartile, with this being significantly different to the percentage of male-headed households, in 2011 and 2013. 27.2 per cent of households, which increased their overall quartile positioning, however, the exact same percentage decreased in their position, whilst 45.6 per cent saw no change in their position. Showing how despite there being considerable variability in asset ownership at the household level, this is not significant enough to impact on larger more substantial change.

In all year's female-headed households had a higher mean HFIAS score, meaning they were experiencing greater levels of food insecurity at the time of the questionnaire. In 2013, this difference was statistically significant; female-headed households had a mean score of 7.62 in comparison to 4.80 for male-headed households. When using the four HFIAS categories results showed that the percentage of 'severely food insecure' households decreased, a positive indication of the food security situation. In the comparable years, the percentage decreased from 35.9 per cent in 2011 to 33.3

per cent in 2012 and again to 30.8 per cent in 2013. In 2011, 2012 and 2013 there was a higher proportion of female-headed households in the 'severely food insecure' category, in 2013 this was statistically significant with 39.2 per cent for female-headed households in comparison to 25.0 per cent of male-headed households. The mildly and moderately food insecure categories appear to show similar trends that indicate that households moved more into the 'food secure' category over the study period.

With regard to the HDDS, the overall mean fluctuated but not significantly over the study period. There were only two food groups that were consistently consumed over the study period: cereals and spices, condiments and beverages groups. However, some results of interest include the declines in households reporting consumption of egg, fish, pulses, from 2012 and 2013, but in contrast, milk and milk products and oils and fats increased. As already established the 2013 maize harvest was significantly lower in 2013, indicating a poor harvest at a time of national economic strain. Thus, a household's ability to purchase animal protein and cooking oil appeared to be more restricted in comparison to 2011 and 2012.

Two differences found in the results suggest that male-headed households have more access to animal proteins in comparison to female-headed households. In 2011, 2012 and 2013 male-headed households were more likely to have consumed meat and meat products in comparison to female-headed households. Similarly, in 2012 and 2013, male-headed households were more likely to have consumed eggs in comparison to female-headed households.

When differences in household food security results were disaggregated by the asset score quartiles, important differences were evident. For HFIAS, the higher asset score quartile, the better the HFIAS score. So much so that in 2013, the worst year for food security, the mean HFIAS for those in Q1 was 7.23 in comparisons to 1.75 for those in Q4, the lowest HFIAS score in any year, in any quartile. This trend is mirrored with the HDDS. This indicates that households with greater assets to their disposal are more protected from wider food shortages and price spikes.

The first correlation analysis run found that, apart from 2010, all the outcome variables had statistically significant relationships with each other. Which strengthens the assumption that asset ownership and food security are critically linked. This was followed by broadening the correlation scope by including the main independent variables presented in Chapter 5, which are considered as key characteristics of the studied livelihood system. This correlation analysis found a wide variety of independent variables that had either a statistically positive or negative relationship with the asset score, HFIAS and HDDS over the study years. Some variables that had consistently positive relationships across all variables included: total value of crops sold, maize yields, household head education. One negative relationship that appeared numerous times over the four years with all three variables was paid work. This is likely since the poorest households are more reliant on casual labour (i.e. ganyu) in order to meet basic needs; therefore those who are more likely to be carrying out paid work are the ones who have worse results in their asset scores, HFIAS and HDDS.

Finally, the multivariate regression analysis was carried out. The regression models included independent variables that were found to have some level of a statistically significant relationship with the independent variables over the study period. Some notable variables that were found to have a significant influence on the asset score, HFIAS and HDDS were: land ownership, livestock value, total crops sold, district, household education, savings, and ownership of an enterprise.

These findings are crucial to understanding what household characteristics and livelihood strategies influence food security and asset ownership outcomes. From the findings, it can be assumed that male headed households are better off in terms of assets ownership, food security and less vulnerable to related shocks and stresses over time. In terms of livelihood strategies, crop production for sale and livestock ownership appear to be the main strategies that have a positive influence on household asset ownership and food security; however casual labour appears to have a negative influence. Considering the seasonal nature of the demand for casual labour, with demand peaking during the planting and harvesting season, the links it has with household own food security are undoubtedly very strong.

Chapter 7: Agricultural Change Processes Influencing Food Security & Asset Ownership

The previous two chapters have analysed the assets available to households, the main livelihood strategies employed and the ultimate livelihood outcomes in terms of food security and asset ownership. This chapter looks at the role of key agricultural change processes used and how these contribute to food security and poverty reduction. To give depth to the analysis, the scope of this chapter is limited; firstly, to two study years, 2012 and 2013, and secondly to two dependent variables, household dietary diversity score (HDDS) and the household asset score.

The first change process explored in the analysis is production diversity given the growing body of evidence around the association between production diversity and food and nutrition security (Kahsay, 2017; Koppmair, Kassie and Qaim, 2017). The second change process explored is market access and participation, as smallholder households are typically both buyers and sellers of food and other agricultural commodities, often buying and selling the same product within a year to meet basic food needs (e.g. maize) (Koppmair, Kassie and Qaim, 2017). The third change process explored is external supports; this would fall under the *'Policies, Institutions, Process and Structures'* component of the livelihoods framework. The external supports change process looks at; households' access to extension services, association participation, and FISP support (i.e. social protection support). All these external supports are products of either national-level policies or interventions by the government or private sector. The fourth and final change process explored is the uptake of agricultural technologies, which includes the use of improved maize varieties, chemical fertiliser and post-harvesting processing knowledge. Table 60 gives an overview of the studied variables, along with a brief description organised by the proposed agricultural change process.

Table 60: Description of variables used to explore agricultural change processes employed

Variable	Description
Change Process 1: Production diversity	
Production diversity score	Number of different food groups produced on the farm
Crop species count	Number of different crop types cultivated on the farm
Change Process 2: Market access and participation	
Distance to markets (km)	Average distance to the location where crops were sold
Share of maize sold	Percentage of total maize production sold
Share of other food crops sold	Percentage of other food crop production sold
Income earned from crop sales	Mean income earned from all crops sales reported
Change Process 3: External Supports	
Access to extension services	Number of extension service visits received
Association participation	Number of years where a household was a member of any association
FISP support	Households reported receiving any FISP coupons
Change Process 4: Uptake of agricultural technologies	
Improved maize varieties	Households reported cultivation of improved maize varieties
Chemical fertiliser use	Households reported the application of chemical fertiliser
Post-harvesting processing knowledge	Number of aflatoxin prevention techniques households are aware of

Change Process 1: Production Diversity

During each questionnaire round, participants were asked what type of crops they cultivated in the previous rain-fed and dimba season (i.e. past 12 months). A detailed description of the crops cultivated and to what extent is presented in chapter 5. Using the data from the basic single choice questions included in the crop production section of the questionnaire, two variables were created to investigate production diversity and how these associates with food security and asset accumulation. The basic descriptive results for these variables for 2012 and 2013 are presented below, and later this chapter, the result from a regression model are presented and discussed.

A basic crop species count was calculated; this is a simple count of the number of crop species produced on the farm. Although this gives some insight into the number of crop species grown, recent studies have argued that this does not necessarily reflect diversity from a dietary point of view (Koppimair et al., 2017, Sibhatu KT, et al., 2015, Jones AD, et al., 2014, Herforth A, 2010). To make up for this weakness, the production diversity score was calculated to better account for the dietary perspective and to factor in the role of livestock in the dietary diversity portfolio, which is not included in the crop species count. The production diversity score was constructed using the same Household Dietary Diversity Score food groups. However, of the 12 food groups, three groups were not used as there were either irrelevant to crop production (i.e. spices, condiments and beverages, and oils and fats) or it was not relevant to the context (i.e. fish production). With this approach, a household could score a maximum of 9 and a minimum of 0 as they are only assigned a score of 1 for each food group despite if they cultivated several species in a food group, therefore the production diversity score is smaller than the simple crop species count.

The production diversity score in 2012 was 4.94, this increased, although not significantly to 5.16 in 2013 (Paired samples t-test; 2012 vs 2013 p=0.233). An independent samples t-test showed that there was no significant difference between the male-headed household and female-headed household in 2013 (p=0.271). However, in 2013, there was a significant difference in 2013 when male-headed households had a significantly greater production diversity score in comparison to female-headed households (p=0.005).

In contrast to the production diversity score, the crop species count decreased from 4.72 in 2012 to 3.21 in 2013; a paired samples t-test showed that this decrease was significant (p=0.000). Like the gender differences found in the production diversity score, there was no significant difference between male-headed and female-headed households crop species count in 2012, however, in 2013 male-headed households had a significantly greater score than female-headed households (Independent samples t-test; 2012 p=0.289; 2013 p=0.044).

Table 61: Mean Production Diversity Score and Crop Species Count

		2012	2013
Production diversity score	MHH	5.03	5.62***
	FHH	4.71	4.48***
	Overall	4.94	5.16
Crop species count	MHH	4.82	3.39**
	FHH	4.46	2.94**
	Overall	4.72***	3.21***

*** significant at 1%, ** significant at 5%, * significant at 10%

For both variables, households who were in the higher asset score quartiles achieved greater diversity scores in both 2012 and 2013. For the production diversity score, the lowest quartile had a mean score of 4.01 in comparison to those in the higher quartile, which had a score of 5.92. This gap grew even further in 2013 with the mean score for Q1 households decreasing to 3.79 and the score for households in Q4 increasing to 7.88. A one-way between-groups ANOVA test showed that these differences between the four quartiles were statistically significant in both years (2012 p=0.000, 2013 p=0.000).

In 2012, the one-way between-groups ANOVA test showed that there were marginal differences between the four asset quartiles and their crop species count score was not statistically significant (2012 p=0.161). However, in 2013, all the quartile groups saw a reduction in their crop species count score, and the differences between the four groups became statistically significant (2013 p=0.000).

Therefore, Table 62 indicates that higher the asset score quartile households are in the greater the production diversity achieved.

Table 62: Mean Production Diversity Score and Crop Species Count by Asset Score Quartile

		2012	2013
Production diversity score	Q1	4.01***	3.79***
	Q2	5.87***	6.29***
	Q3	5.40***	8.36***
	Q4	5.92***	7.88***
Crop species count	Q1	4.45	2.60***
	Q2	4.88	3.85***
	Q3	5.00	4.36***
	Q4	5.69	4.25***

*** significant at 1%, ** significant at 5%, * significant at 10%

Change Process 2: Market Access & Participation

Distance to markets

For every crop households reported selling from the last season they were asked how far in kilometres the point of sale was from their home. To construct the distance to markets variable, the average was calculated for distances reported for all crop sales. Table 63 shows the average distance to markets for crops sold in the 2010-2011 and 2011-2012 seasons; this data was collected in the 2012 and 2013 study rounds, respectively. There was a significant decrease in the mean distance to markets in 2010-2011, 2.92 km, in comparison to 2011-2012, 1.44 km (Paired samples t-test; 2010-2011 vs 2011-2012 p=0.000).

Interestingly male-headed households appear to travel further to sell their produce in comparison to female-headed households, 3.26 km in comparison to 1.95 in the 2010-2011 season, which was statistically significant and 1.59 km in comparison to 1.16km in the 2011-2012 season (Independent samples t-test; 2010-2011 p=0.028; 2011-2012 p=0.241). This may be related to findings from several focus group discussions where participants reported the increased prevalence of small-scale traders coming to households on bicycles and trading household items (e.g. cooking utensils, material, clothing) for crops that they can then transport to trading centres and sell at a higher price. Participants reported that this method of sale is where they get the worse price, but the hassle of transporting to the market is removed, which can be especially difficult for female-headed households.

Table 63: Mean Distance to Markets for Crop Sales (km)

		2010-2011	2011-2012
Distance to markets (km)	MHH	3.26**	1.59
	FHH	1.95**	1.16
	Overall	2.92***	1.44***

*** significant at 1%, ** significant at 5%, * significant at 10%

Table 64 presents the mean distance travelled to markets for each of the asset score quartiles. In the 2010-2011 season, the lowest asset score quartile had the shortest mean distance to markets, 2.37 km, and the third quartile had the longest distance with 6.14 km, this difference was statistically significant. In 2011-2012, the results are varied with the fourth quartile reporting the shortest distance 1.18 km and the third quartile having the longest distance, with none of the differences between the quartiles being statistically significant (One-way between groups ANOVA; 2010-2011 Overall p=0.002, Q3 is significantly different from all other groups Q1 p=0.001, Q2 p=0.009, Q4=0.018; 2011-2012 Overall p=0.927).

Table 64: Mean Distance to Markets for Crop Sales by Asset Score Quartile (km)

		2010-2011	2011-2012
Distance to markets (km)	Q1	2.37***	1.49
	Q2	2.99***	1.36
	Q3	6.14***	1.76
	Q4	2.42**	1.18

*** significant at 1%, ** significant at 5%, * significant at 10%

Share of crops sold

There appeared to be two types of motivations for selling staple or other food crops in the study area. The first being where the main objective would be making return on investment, farmers would be hoping that the prices come harvest time would be enough to cover the costs and make profits, legumes like groundnut and soya were the most common crops grown for this purpose, with wealthier households growing a proportion of their maize as a cash crop. The second type of sale would be in response to household stress; these sales would be made to meet immediate basic needs, often done during the green harvest or very soon after the harvest when prices are at their lowest. By investigating the share of maize and other food crops sold an insight into how households are participating in the market and later use these variables to see how this influences food security and poverty reduction.

Table 65 shows that a much greater proportion of other food crops are sold in comparison to maize. 63.7 per cent of other food crops were sold in the 2010-2011 season in comparison to 9.3 per cent of maize being sold. The contrast is somewhat similar for the 2011-2012 season. However, a significantly lower proportion of other crops were sold in 2011-2012 (48.1 per cent) in comparison to 2010-2011 (63.7 per cent), whereas roughly the same portion of maize was sold in 2011-2012 (9.0 per cent) in comparison to 2010-2011 (9.3 per cent) (Maize sales paired samples t-test; 2010-2011 vs 2011-2012 p=0.806) (Other food crops paired samples t-test; 2010-2011 vs 2011-2012 p=0.000).

The only notable difference between male-headed and female-headed household results are for the 2011-2012 season where male-headed households sold 52.2 per cent of their other food crops, a statistically significantly larger proportion than that of female-headed households who sold 41.7 per cent (Maize sales Independent samples t-test; 2010-2011 p=0.246; 2011-2012 p=0.283) (Other food crops Independent sample t-test; 2010-2011 p=0.391; 2011-2012 p=0.041).

Table 65: Mean Percentage Share of Maize and Other Food Crops Sold from Harvests (%)

		2010-2011	2011-2012
Share of maize sold	MHH	10.2%	10.0%
	FHH	7.1%	7.5%
	Overall	9.3%	9.0%
Share of other food crops sold	MHH	64.8%	52.2%**
	FHH	60.2%	41.7%**
	Overall	63.7%***	48.1%***

*** significant at 1%, ** significant at 5%, * significant at 10%

By disaggregating the two variables by the asset score quartiles, results show that the proportion of maize sold increases as the asset score quartile increases, with the difference between Q1 (6.7 per cent) and Q4 (19.4 per cent) in the 2010-2011 season is statistically significant (Table 66) (One-way between groups ANOVA; 2010-2011 overall p=0.045, Q1 vs Q4 p=0.038; 2011-2012 overall p=0.739).

There were no significant differences between the quartiles and the proportion of other food crops sold. In the 2010-2011 season, Q1 sold the lowest proportion of 60.9 per cent of other food crops with Q3 selling the highest proportion of 72.7 per cent (One-way between groups ANOVA; 2011-2012 overall p=0.288). In the 2011-2012 season, there was even less variance between the four groups with Q1 again selling the lowest proportion of 44.9 per cent with Q3 selling the highest proportion of 59.0 per cent (One-way between groups ANOVA; 2011-2012 overall p=0.236).

Table 66: Share of Maize and Other Food Crops Sold by Asset Score Quartile

		2010-2011	2011-2012
Share of maize sold	Q1	6.7%**	8.8%
	Q2	10.7%	7.8%
	Q3	8.8%	11.9%
	Q4	19.4%**	12.7%
Share of other food crops sold	Q1	60.9%	44.9%
	Q2	62.5%	48.6%
	Q3	72.7%	59.0%
	Q4	69.9%	58.0%

*** significant at 1%, ** significant at 5%, * significant at 10%

Income earned from crop sales

As reported in Chapter 5, year on year, there was a significant change in the total mean amount of income earned from all crop sales (Table 67). The total mean income earned went from 14,775 MWK in 2008-09 to 43,379 MWK in 2010-11, this increased again to 50,537 MWK in 2011-12 (One-way repeated measures; overall p=0.000; 2008-09 vs. 2010-11 p=0.000; 2008-09 vs. 2011-12 p=0.000; 2010-11 vs. 2011-12 0.014). Although each year male-headed households earned a higher mean income from crop sales in comparison to female-headed households, only in 2008-09 was this difference significant (Independent samples t-test; 2008-09 p=0.046; 2010-11 p=0.127; 2011-12 p=0.141) (Table 26).

Table 67: Mean Total Income Received from All Crop Sales (MWK)

	2008-09	2010-11	2011-12
MHH	16,822	48,270	55,876
FHH	11,128	28,829	41,259
Overall	14,775	43,379	50,537

*** significant at 1%, ** significant at 5%, * significant at 10%

By disaggregating the total income received from all crop sales variables by the asset score quartiles, results show that household in Q2 received the highest mean income the 2010-11 season, whereas household in Q3 received the lowest mean income. In the 2011-12 season, Q3 then received the highest mean income and household in Q4 received the lowest mean income. The rationale for the lower mean incomes for Q3 in 2010-11 and Q4 in 2011-12 could be that household with greater assets bases may diversify their livelihood strategies into non- or off-farm activities and thus are less reliant on sales of crop produced.

Table 68: Mean Total Income Received from All Crop Sales (MWK) by Asset Score Quartile

	2010-11	2011-12
Q1	40,269	45,179
Q2	53,758	57,533
Q3	21,079	70,325
Q4	41,945	37,723

Change Process 3: External Supports

Access to Extension Services

Owens et al. (2001) explores the impact of extension services on-farm production; findings showed that access to agricultural extension services raises the value of crop production by 15 per cent in Zimbabwe, however also acknowledges how the impact of extension services on-farm production is a contested one and should be approached with caution (cited by Chirwa, 2007; Owens, Hoddinott, & Kinsey, 2001). In Malawi agricultural extension services are provided by the ministry of agriculture, NGOs, and in some areas the private sector (e.g. the estate sector or tobacco companies). Since independence, the extension services were largely organised around farmer clubs. However, this is reported to have collapsed in 1992 following the failure of the agricultural credit scheme that also operated through the farmer clubs (Owens, Hoddinott and Kinsey, 2001).

In this study, each year households were asked how many extension services visits they received in the last 12 months, be it from the Ministry of Agriculture or otherwise. The type of advice received during these extension service visits included in order of popularity; crop husbandry, market advice, pests and disease, livestock advice.

Results from the 2012 and 2013 study rounds show that households received a mean of 3.91 and 8.99 extension visits respectively, the substantial increase in the number of visits in 2013 was statistically significant (Table 69) (Paired samples t-test; 2012 vs 2013 p=0.000).

It should be noted that the studies villages have the advantage of having both government extension officers and ExAgris extension officers, all of whom are actively working in the areas. During focus group discussions farmers repeatedly referred to their improved knowledge of improved agricultural practices (e.g. double planting, making compost, post-harvest processing) as one of the major changes over the study period. These practices would largely have been learnt through extension services and participation in groups like farmers associations, which is explored in the next section.

Table 69: Mean Number of Extension Visits Received by Households in the Last 12 Months

	2012	2013
MHH	4.01	8.87
FHH	3.60	9.22
Overall	3.91***	8.99***

*** significant at 1%, ** significant at 5%, * significant at 10%

However, the wealth of households appears to influence the number of visits a household received. By disaggregating the number of visits received in the last 12 months by the asset score quartiles, a pattern emerges for both 2012 and 2013. The lowest quartile groups (i.e. the poorest households) received the lowest number of extension visits, 2.69 in 2012 and 8.10 in 2013. In comparison, the third quartile received the greatest number of visits, 7.82 in 2012 and 15.92 in 2013. These differences were statistically significant (One-way between groups ANOVA; 2012 p=0.0000; 2013 p=0.011).

Table 70: Extension Visits Received by Households in the Last 12 Months by Asset Score Quartile

	2012	2013
Q1	2.69***	8.10***
Q2	3.16***	8.20***
Q3	7.82***	15.92***
Q4	5.8***	8.57

*** significant at 1%, ** significant at 5%, * significant at 10%

Association Participation

A major source of extension training and support is from those who facilitate farmer associations and groups. During the study period, there were several associations functioning in the study areas these were supported to varying degrees by the Ministry of Agriculture, IRALD, Malawi Basin, Action Aid, CadeCom, Limbe Leaf, Africa Child Mission, NASFAM and ExAgris.

Associations involved in the study who were supported by ExAgris through the groundnut out-growers' scheme were supported in the set-up of sustainable seed systems, and training in agronomic practices using demonstration plots and field exchanges. The agronomic practices promoting included; early planting, use of improved seed, increased plant population, scouting for and control of pests and diseases, and fertiliser application and improved harvesting and drying. Associations were also trained in the calculation of gross margins to enable them to estimate financial benefits of additional costs and to enable them to make comparisons between crops with the aim of them being able to make more informed planting decisions in the future. Some of the stronger association were also supported in the warehousing and bulk selling of soya and groundnut; however, this was not common and often fraught with complaints from both the association members and ExAgris.

Results show that between 52.3 per cent (2012) and 54.4 per cent (2013) of households are members of associations (Table 71) (McNemar's test; 2012 vs 2013 p=0.694). Although not statistically significant, there is a greater percentage of male-headed households with membership, 55.9 per cent in 2012 and 59.5 per cent in 2013, in comparison to female-headed households, 42.3 per cent in 2012 and 46.8 per cent in 2013 (Chi-square test; 2012 p=0.128; 2013 p=0.111).

Table 71: Percentage of households reporting having membership in an association

	2012	2013
MHH	55.9%	59.5%
FHH	42.3%	46.8%
Overall	52.3%	54.4%

When considering association membership and wealth status, results show that the wealthier asset score quartiles are more likely to be members of an association. However, this is not statistically significant since some of the sub-samples are too small to detect a difference using the chi-square test. This aside Table 72 shows that in 2012 the quartile with the lowest percentage of households reporting membership was Q1 with 41.5 per cent, the quartile with the highest percentage was Q3 with 86.7 per cent. Again in 2013, the lowest quartile Q1 had the lowest percentage, with 43.2 per cent, Q4 had the highest with 100.0 per cent, followed by Q3 with 78.6 per cent.

Table 72: Households reporting having membership in an association by asset score quartile

	2012	2013
Q1	41.5%	43.2%
Q2	55.9%	61.0%
Q3	86.7%	78.6%
Q4	69.2%	100.0%

Although not presented here households were asked in all four study years if they were members of an association. For the entire study period, the mean number of years a household held membership was 2.42 years. Male-headed households had a mean of 2.72, which was significantly larger than that of female-headed households who had a mean of 1.97 (Independent samples t-test p=0.000). Similar differences were found between the asset score quartiles, the lower the asset quartile, the less time spent as members of associations; Q1 households had a mean of 2.00 years, in comparison to households in Q4 who had a mean of 3.50 years.

Figure 31 and Figure 32 show the distribution of households by the number of years of reported association membership. Notably, female-headed households (23 per cent) were more likely to have 0 years membership in comparison to male-headed households (2 per cent). Likewise, the lowest asset score quartiles, Q1 and Q2, were the only groups to have reported 0 years of membership, with 16 per cent and 3 per cent, respectively (Figure 32).

Figure 31: Number of Years Reported Membership of Associations

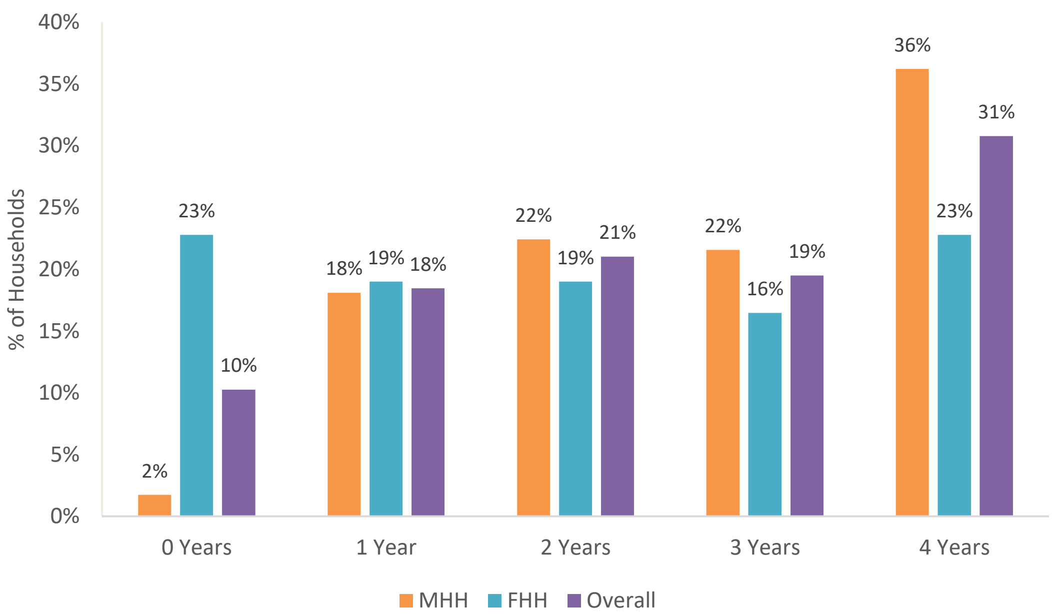
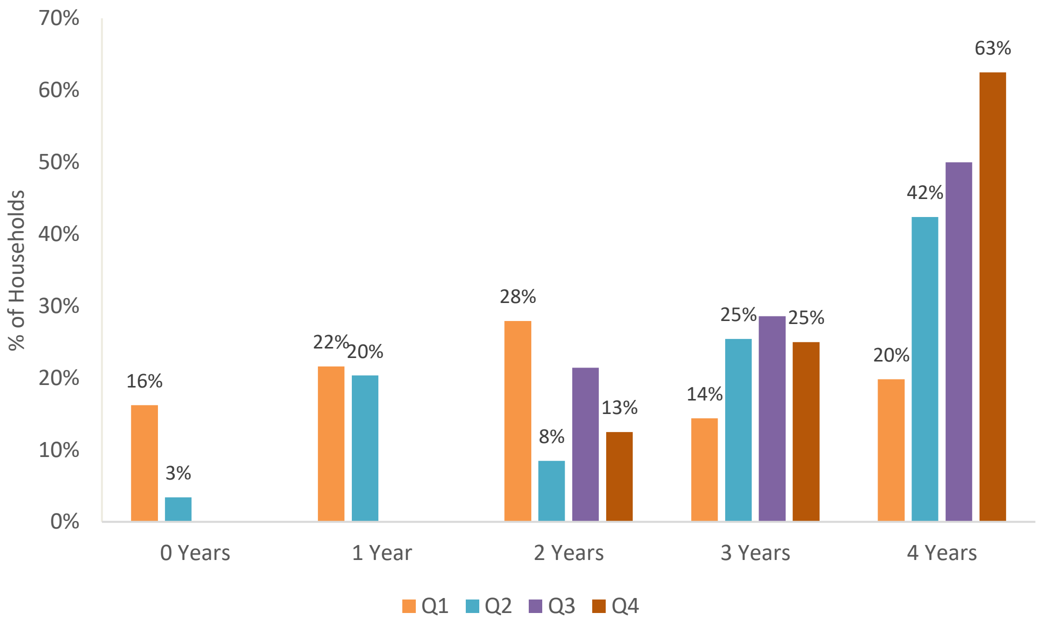


Figure 32: Number of Years Reported Membership of Associations by Asset Score Quartile



Participation in the Farm Input Subsidy Programme

In the 2011-2012 and 2012-2013 seasons, the intended FISP package per household was one voucher for a 50 kg bag of 23:21:0 +4S basal fertiliser (NPK) and one voucher for a 50 kg bag of urea for top dressing. These are supplemented with improved maize seed (OPV or hybrid), legume seed, and maize storage chemicals, however on a very ad hoc basis compared to the fertiliser.

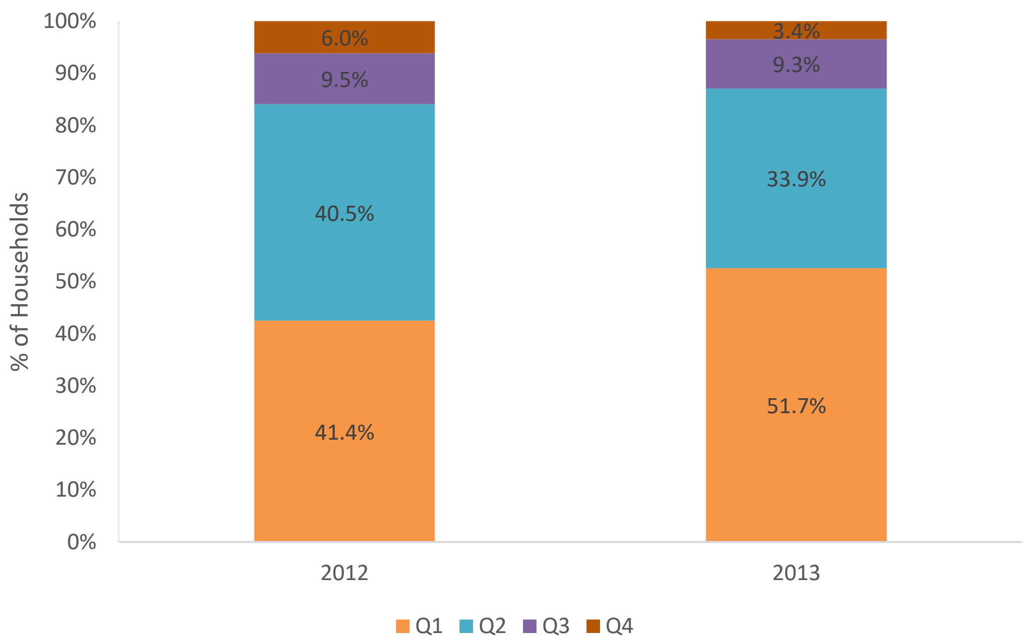
There were no significant changes between the 2011-2012 and 2012-2013 season in terms of the percentage of households receiving coupons (Table 73). This percentage was almost mirrored for male-headed and female-headed households.

Table 73: Percentage of Households Reporting Receiving FISP Coupons

	2011-2012	2012-2013
MHH	58.7%	61.2%
FHH	61.5%	59.5%
Overall	59.5%	60.4%

The official target population of FISP is extremely poor. There are long-running issues with targeting, which have been widely discussed in the literature (Chirwa and Dorward, 2013). However, when disaggregating the results by the asset score quartiles, it appears that the households who received coupons in the 2011-2012 and 2012-2013 seasons were predominantly from the lowest asset score quartiles Q1 and Q2, with small percentages coming from Q3 and Q4 (Figure 33).

Figure 33: Breakdown of FISP recipients by Asset Score Quartile



Change Process 4: Uptake of Technology in Production

Improved Seed

Three types of maize are cultivated in Malawi: local/traditional, hybrid, and composite. Farmers can renew local variety seeds themselves, whereas hybrid varieties need to be purchased every season, and composite varieties (i.e. varieties generated by natural crossings between the local varieties and hybrid varieties developed by modern breeding methods) can be recycled for two or three years (JAICAF, 2008). Results from the household questionnaire and qualitative investigation show a shift in farmers' preferences away from local and traditional varieties towards improved varieties. The main reasons reported for this shift was the potential higher yields and the increased availability of hybrid seed through FISP. However, farmers raised concerns about the increasing nominal cost for inputs required for hybrid seeds and the increasing need for inorganic fertiliser due to poor soil fertility.

A majority of the sample planted hybrid maize seeds in the 2011-2012 (80.5 per cent) and 2012-2013 (82.1 per cent) rain-fed seasons (Table 74) (McNemar's test; p=0.743). There was a higher percentage of male-headed households planting hybrid maize in both seasons in comparison to female-headed households with this difference being statistically significant in the 2012-2013 season (Table 74) (Chi-square test; 2011-2012 p=0.074; 2012-2013 p=0.016).

Table 74: Percentage of Households Using Hybrid Maize Seeds

	2011-2012	2012-2013
MHH	83.9%	87.9%**
FHH	71.2%	73.4%**
Overall	80.5%	82.1%

*** significant at 1%, ** significant at 5%, * significant at 10%

When the variable was disaggregated by the asset score quartiles, results show that the lowest quartiles have the lower percentages of hybrid maize usage. In the 2011-2012 and 2012-2013 asset score, Q1 had the lowest percentage of households planting hybrid maize with 72.3 per cent and 75.7 per cent respectively. In comparison, 100 per cent of Q4 households planted hybrid maize in both seasons and 86.7 per cent of Q3 households planting hybrid maize in 2011-2012 and 100 per cent in 2012-2013 (Chi-Square test; 2011-2012 p=0.040; 2012-2013 p=0.036).

Table 75: Percentage of Households Using Hybrid Maize Seeds by Asset Score Quartiles

	2011-2012	2012-2013
Q1	72.3%**	75.7%**
Q2	85.3%**	86.4%**
Q3	86.7%**	100.0%**
Q4	100.0%**	100.0%**

*** significant at 1%, ** significant at 5%, * significant at 10%

Use of Chemical Fertiliser

Repeatedly during focus group discussions and general observations in the 2012 and 2013 study rounds the issue of the 'lack of inputs' (i.e. fertiliser) was repeatedly raised by farmers. Discussions were often around how households are unable to afford fertiliser and are not getting access to FISP coupons; and if they do get access to coupons and succeed in sourcing the fertiliser often, they must share with many households in the community. In addition to this, farmers are dealing with the worsening soil infertility and increased rainfall variability.

In the 2011-2012 season, 70.3 per cent of households applied chemical fertiliser to their hybrid maize, this decreased, although not significantly, to 66.7 per cent in the 2012-2013 season (Table 76) (McNemar's test p=0.419). In both seasons a higher percentage of male-headed households applied chemical fertiliser in comparison to female-headed households, in 2011-2012 72.7 per cent versus 63.5 per cent and in 2012-2013 75.0 per cent versus 54.4 per cent (Chi-square test; 2011-2012 p=0.283; 2012-2013 p=0.005).

Table 76: Percentage of Households Applying Chemical Fertiliser to their Maize

	2011-2012	2012-2013
MHH	72.7%	75.0%***
FHH	63.5%	54.4%***
Overall	70.3%	66.7%

*** significant at 1%, ** significant at 5%, * significant at 10%

When disaggregated by the asset score quartiles, results show that households in the lower asset quartiles have the lowest percentage of households applying chemical fertiliser. For example, 56.4 per cent of Q1 in 2011-2012 and 56.8 per cent of households in 2012-2013 applied fertiliser compared to 92.3 per cent and 100.0 per cent of Q4 households respectively. Households in Q3 had similarly high percentages of households using chemical fertiliser. These differences between asset score quartiles were statistically significant (Chi-Square test; 2011-2012 p=0.001; 2012-2013 p=0.005) (Table 77).

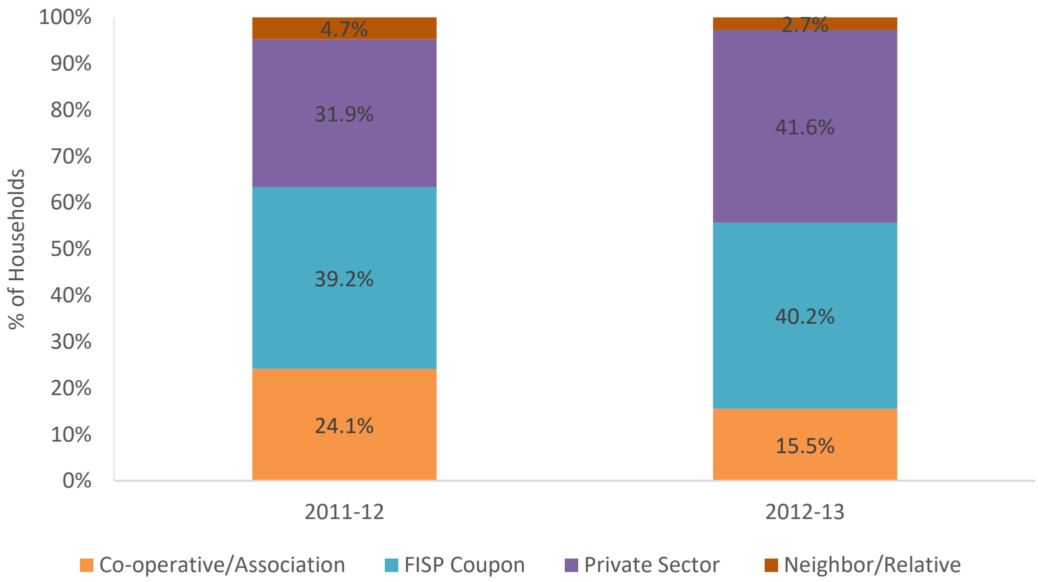
Table 77: Households Applying Chemical Fertiliser to their Maize by Asset Score Quartile

	2011-2012	2012-2013
Q1	56.4%***	56.8%***
Q2	80.9%***	74.6%***
Q3	86.7%***	85.7%***
Q4	92.3%***	100.0%***

*** significant at 1%, ** significant at 5%, * significant at 10%

In the 2011-2012 and 2012-2013 rain-fed seasons, the main source of chemical fertiliser for hybrid maize was either through FISP or the private sector. The high frequency of fertiliser sourced through the highly subsidised system has had a considerable impact on the estimated total cost of inputs used for both seasons as the market value of fertiliser during the 2013 data collection was averaging at 15,000MK per 50kg.

Figure 34: Sources of Chemical Fertiliser Used on Hybrid Maize



Knowledge of Crop Management Techniques

During focus group discussions farmers repeatedly referred to their improved knowledge of improved agricultural practices (e.g. double planting, making compost, post-harvest processing) as one of the major changes over the study period. These practices would largely have been learnt through extension services and participation in groups like farmers' associations, which is explored in the next section. Given that many of the study samples would have actively participated in the associations supported by the ExAgris groundnut out-grower scheme one, the questionnaire tested participants' knowledge of aflatoxin management techniques each year. Participants were asked to list up to three techniques. Table 78 shows there was a statistically significant increase in the percentage of respondents who were aware of at least one technique. it went from 27.2 per cent in 2012 to 55.4 per cent in 2013

(McNemar's test; p=0.000). The percentage of male-headed and female-headed households with knowledge of at least one technique was largely similar (Chi-square test; 2012 p=0.818; 2013 p=0.123). Interestingly, the longer the household was involved in an association, the greater the mean number of techniques they were aware of. Households who had 4 years of exposure were able to name 1.9 different techniques, those with one to three years' exposure named 1.2 different techniques, and finally, those with no exposure to an association were able to name a mean number of 0.7 different techniques.

Table 78: Respondents Aware of At Least One Aflatoxin Management Technique

	2012	2013
MHH	28.0%	60.3%
FHH	25.0%	55.4%
Overall	27.2%***	55.4%***

*** significant at 1%, ** significant at 5%, * significant at 10%

When the variable was disaggregated by the asset score quartile results for 2012 show significant differences between the groups with Q1 having the lowest percentage of households who were aware of at least one aflatoxin management technique with 13.8 per cent, Q4 had the highest percentage with 69.2 per cent. In 2013 the results are somewhat more evenly distributed with Q4 having the lowest percentage with 37.5 per cent and Q3 having the highest of 92.9 per cent. Q1 increased their percentage from the low base of 13.8 per cent in 2012 to 45.9 per cent in 2013 (Chi-square test; 2012 p=0.000; 2013 p=0.002).

Table 79: Respondents Aware of At Least One Aflatoxin Management Technique by Asset Score Quartile

	2012	2013
Q1	13.8%***	45.9%***
Q2	35.3%***	64.4%***
Q3	26.7%***	92.9%***
Q4	69.2%***	37.5%***

*** significant at 1%, ** significant at 5%, * significant at 10%

Agricultural Change Processes Influencing Food Security & Asset Ownership

The variables presented in this chapter aim to give an insight into the agricultural change process employed by smallholder households in the pursuance of increased levels of food security and asset ownership. This section takes the results presented earlier and investigates how they are related to and influence household food security and asset ownership. The household asset score and the household dietary diversity score (HDDS) were used as dependent variables for the analysis.

Firstly, the relationship between the dependent variables, HDDS and the household asset score, and the eleven independent agricultural change process variables were investigated using Spearman rho analysis. From this, the variables that had a consistently significant medium to strong correlation to the dependent variables in both 2012 and 2013 were then incorporated in the standard multiple regression models. The multiple regression models were used to analyse the impact the agricultural change process variables had on the dependent variables.

Agricultural Change Processes Influencing Household Asset Ownership

Table 80 shows the correlation coefficients for the change process variables and the household asset score variable. The production diversity score variable had a strong correlation coefficient with the household asset score in both 2012 and 2013. Mean income earned from crop sales had a significantly strong relationship with the household asset score in 2012; this reduced to a significantly medium-strength relationship in 2013. Chemical fertiliser use had a consistently medium-strength correlation with the asset score that was statistically significant in 2012 and 2013. Three variables that had a consistently medium, but statistically significant correlation, with the household asset score were; association participation, FISP support and improved maize varieties. Access to extension services had a significantly strong correlation with the household asset score in 2012, but no correlation in 2013. The share of maize was significantly correlated with the household asset score in 2012, but there was no statistically significant correlation in 2013. On the other hand, the share of food crops sold was correlated with the household asset score in 2013 but not so in 2012. The only variable to have no statistically significant correlation to the household asset score in either 2012 or 2013 was the distance to markets.

Table 80: Summary of Correlation Analysis of Change Process & Household Asset Score variables

	2012		2013	
	Correlation Coefficient	Sig. (2-tailed)	Correlation Coefficient	Sig. (2-tailed)
Production diversity score	0.539***	0.000	0.663***	0.000
Crop species count	0.115	0.113	0.522***	0.000
Distance to markets (km)	0.131	0.108	0.066	0.396
Share of maize sold	0.229***	0.001	0.100	0.167
Share of other food crops sold	0.141	0.109	0.152**	0.045
Total Crops Sold (MWK)	.549***	0.000	.488***	0.000
Access to extension services	0.337***	0.000	0.101	0.257
Association participation	0.247***	0.001	0.286***	0.000
FISP support	0.210***	0.004	0.156**	0.031
Improved maize varieties	0.181**	0.012	0.244***	0.001
Chemical fertiliser use	0.300***	0.000	0.291***	0.000
Post-harvesting processing knowledge	0.279***	0.000	0.274***	0.000

Coefficient strength; small r=.10 to .29, medium r=.30 to .49, large r=.50 to 1.0; *** significant at 1%, ** significant at 5%, * significant at 10%

Table 81 shows the results from the OLS multivariate regression model with the asset score variables from 2012 and 2013. Numerous assumptions were run to ensure the four iterations of the model were valid[14]. Six variables that were found to have a relationship with the asset score in Table 80 were included. In 2012 and 2013, both production diversity score and total crops sold had a significantly positive influence on the household asset score. The only other variable found to have a significantly positive influence on the household asset score was chemical fertilizer use in 2012.

[14] There was linearity as assessed by partial regression plots and a plot of studentized residuals against the predicted values. There was independence of residuals, as assessed by a Durbin-Watson statistic of 1.966 and 2.041 for the 2012 and 2013 models respectively. There was homoscedasticity, as assessed by visual inspection of a plot of studentized residuals versus unstandardized predicted values. There was no evidence of multicollinearity, as assessed by tolerance values greater than 0.1. There were no studentized deleted residuals greater than ±3 standard deviations, no leverage values greater than 0.2, and values for Cook's distance above 1. The assumption of normality was met for both models, as assessed by a Q-Q Plot. The multiple regression model statistically significantly predicted the household asset score, in 2012 $F(5, 184) = 11.512$, $p < .0005$, adj $R2 = 0.218$ and in 2013 $F(5, 186) = 26.099$, $p < .0005$, adj $R2 = 0.397$.

Table 81: Household Asset Score & Change Processes Multiple OLS Regression Summary

	2012			2013		
	Unstandardized regression coefficient	Standard Error	Sig.	Unstandardized regression coefficient	Standard Error	Sig.
Production diversity score	0.099***	0.048	0.043	0.162***	0.024	0.000
Total crops sold (MWK)	0.000***	0.000	0.000	0.000***	0.000	0.000
Association participation (y/n)	0.161	0.158	0.309	-0.044	0.120	0.718
FISP support	-0.117	0.164	0.477	0.161	0.113	0.157
Chemical fertilizer use (y/n)	0.483***	0.181	0.009	0.029	0.126	0.817
Access to extension services (n)	0.117	0.172	0.499	-0.104	0.117	0.376
Constant	2.746			2.453		

*** Significant at 1%, ** significant at 5%, * significant at 10%.

Agricultural Change Processes Influencing Household Food Insecurity Access Scale

Table 82 shows the correlation coefficients for the change process variables and the HFIAS variable. Again, it should be noted that for the HFIAS, the higher the score, the more food insecure the household. Therefore, when the correlation coefficients indicate a negative relationship this should be interpreted as a positive relationship as the lower the score, the better the food security status. There were numerous significantly negative relationships (i.e. desirable relationships) found in the analysis for both years; these include production diversity score, total crops sold, association participation and chemical fertilizer use. Other variables that had significant relationships, but only in one of the two years include crop species count, the share of maize sold, FISP support and use of improved maize varieties. The only variable found to have a significantly positive relationship (i.e. undesirable relationship) with the HFIAS was the share of other food crops sold in 2012.

Table 82: Agricultural Change Processes Influencing the Household Food Insecurity Access Scale

	2012		2013	
	Correlation Coefficient	Sig. (2-tailed)	Correlation Coefficient	Sig. (2-tailed)
Production diversity score	-0.178**	0.013	-0.228***	0.001
Crop species count	-0.104	0.150	-0.18**	0.012
Distance to markets (km)	-0.212***	0.008	-0.039	0.612
Share of maize sold	-0.139*	0.053	-0.125*	0.083
Total Crops Sold (MWK)	-.162**	0.042	-.362***	0.000
Share of other food crops sold	0.195**	0.024	-0.049	0.514
Access to extension services	-0.225**	0.015	-0.361***	0.000
Association participation	-0.123*	0.086	-0.152**	0.034
FISP support	-0.113	0.117	-0.174**	0.015
Improved maize varieties	-0.093	0.195	-0.185***	0.010
Chemical fertilizer use	-0.167**	0.020	-0.204***	0.004
Post-harvesting processing knowledge	-0.27***	0.000	-0.082	0.252

Coefficient strength; small r=.10 to .29, medium r=.30 to .49, large r=.50 to 1.0; *** significant at 1%, ** significant at 5%, * significant at 10%

Table 83 presents the results from the negative binomial regression analysis, which was used as an alternative to the OLS regression model, because of its limititations in the analysis of count variables. This model was used to investigate the relative contribution of each of the independent variables to the total variance of the HFIAS variable in the two years. In both years, similar assumptions outlined for the HDDS above were found to be valid for the HFIAS model, and in all years the model statistically significantly predicted the HFIAS. Access to extension services was found to add significantly to the prediction of the HFIAS in 2012 and 2013, whereas total crops sold was found to add significantly to the prediction of the HFIAS in 2012, but not in 2013.

Table 83: HFIAS and Agricultural Change Processes Negative Binomial Regression Analysis

	2012			2013		
	Exp (B)	Standard Errors	Sig.	Exp (B)	Standard Errors	Sig.
Production diversity score	1.039	0.055	0.482	1.034	0.069	0.627
Total Crops Sold (MWK)	0.999***	0.000	0.012	0.999	0.000	0.434
Association participation (y/n)	0.979	0.255	0.934	0.857	0.217	0.478
Chemical fertilizer use (y/n)	1.392	0.276	0.231	0.696	0.267	0.175
Access to extension services (n)	0.925***	0.020	0.000	0.928***	0.032	0.018
Constant	6.581***	0.308	0.000	8.404***	0.402	0.000
Omnibus test			0.000			0.090
Goodness of Fit (value df)			2.274			1.078

*** Significant at 1%, ** significant at 5%, * significant at 10%. Based on overdispersion test results, models estimated with a Negative Binomial regression with a Pearson chi-square parameter estimation. Pearson chi-square test (value df) used as indices of the goodness of fit of the model.

Agricultural Change Processes Influencing Household Dietary Diversity

The correlation analysis results shown in Table 84 show that in 2012, there was a significant medium-strength relationship between production diversity and HDDS; this reduced to a significantly small level strength relationship in 2013. Similarly, the relationship between mean income earned from crop sales and HDDS was significantly medium level in 2013, increasing from a significantly small level in 2012. Three variables that had a consistently medium-strength correlation with the HDDS were the improved maize varieties, chemical fertiliser use, and post-harvesting knowledge variables. Distance to markets, the share of maize sold and FISP support was correlated with the HDDS in 2012, but there was no statistically significant correlation in 2013. On the other hand, the share of food crops sold was correlated with the HDDS in 2013 but not so in 2012. The only variable to have no statistically significant correlation to the HDDS in either 2012 or 2013 was access to extension services.

Table 84: Summary of Correlation Analysis of Agricultural Change Process & HDDS variables

	2012		2013	
	Correlation Coefficient	Sig. (2-tailed)	Correlation Coefficient	Sig. (2-tailed)
Production diversity score	0.384***	0.000	0.258***	0.000
Crop species count	0.091	0.205	0.156**	0.029
Distance to markets (km)	0.219***	0.006	0.007	0.926
Share of maize sold	0.262***	0.000	0.130	0.071
Share of other food crops sold	-0.006	0.948	0.204***	0.006
Total Crops Sold (MWK)	-.162**	0.042	-.362***	0.000
Access to extension services (n)	-0.049	0.600	-0.002	0.986
Association participation	0.179**	0.012	0.151**	0.035
FISP support	0.202***	0.005	0.010	0.886
Improved maize varieties	0.148**	0.039	0.146**	0.042
Chemical fertiliser use	0.251***	0.000	0.217***	0.002
Post-harvesting processing knowledge	0.270***	0.000	0.154**	0.031

Coefficient strength; small r=.10 to .29, medium r=.30 to .49, large r=.50 to 1.0; *** significant at 1%, ** significant at 5%, * significant at 10%

Table 59 presents the results of the Poisson regression model for HDDS. Numerous assumptions were run to ensure the four iterations of the model were valid[15]. Like the household asset score, both the production diversity and total crops sold variables had a significant influence. For total crops sold, this was the case for both years; however, for the production diversity score, this was only in 2012. No other variables were found to have a significant influence on the HDDS in either year.

[15] There was linearity as assessed by partial regression plots and a plot of studentized residuals against the predicted values. There was independence of residuals, as assessed by a Durbin-Watson statistic of 1.552 in 2012 and 2.026 in 2013. There was homoscedasticity, as assessed by visual inspection of a plot of studentized residuals versus unstandardized predicted values. There was no evidence of multicollinearity, as assessed by tolerance values greater than 0.1. There were no studentized deleted residuals greater than ±3 standard deviations, no leverage values greater than 0.2, and values for Cook's distance above 1. The assumption of normality was met, as assessed by a Q-Q Plot. The multiple regression model statistically significantly predicted HDDS in 2012 F (5, 189) = 11.049, p <.0005, adj R^2 = 0.206 and in 2013 F (5, 187) = 3.727, p <.005, adj R^2 = 0.091.

Table 85: HDDS and Agricultural Change Process Generalized Poisson Regression

	2012			2013		
	Exp (B)	Standard Errors	Sig.	Exp (B)	Standard Errors	Sig.
Production diversity score	1.038***	0.010	0.000	1.006	0.008	0.451
Total Crops Sold (MWK)	1.000***	0.000	0.015	1.000***	0.000	0.000
Association participation (y/n)	1.012	0.034	0.727	0.997	0.040	0.938
FISP support (y/n)	1.042	0.035	0.244	0.983	0.037	0.634
Chemical fertilizer use (y/n)	1.041	0.040	0.310	1.030	0.042	0.482
Post-harvesting processing knowledge (y/n)	1.044	0.036	0.227	1.016	0.038	0.671
Constant	6.429***	0.056	0.000	7.627***	0.045	0.000
Omnibus test	-	-	0.000	-	-	0.000
Goodness of Fit (value df)			0.323			0.396

*** Significant at 1%, ** significant at 5%, * significant at 10%. Based on under dispersion test results, models estimated with a generalized Poisson estimator with a Pearson chi-square parameter estimation. Pearson chi-square test (value df) used as indices of the goodness of fit of the model.

Summary

This chapter aimed to build on the findings from the previous two chapters by answering the fourth and fifth research questions. The fourth question proposed to explore what agricultural change processes were utilized by households to pursue their livelihood strategies, and then to look at how these differ by gender of household head and levels of asset ownership. The fifth and final research question aimed to then investigate how the agricultural change processes that were utilized by households influence their food security and asset ownership.

To answer the fourth research question, four agricultural change process categories were created based on previous studies and the Malawian policy in recent years. These categories were production diversity, market access and participation, external supports, and uptake of agricultural technology. Under each of these categories, eleven independent variables in total were designed and analysed. Three lines of enquiry were pursued for each of the eleven variables; change over time, gender differences, and differences across asset ownership groups.

When considering the aspect of change over time, results showed that all four agricultural change process categories had at least one variable that showed a significant change between 2012 and 2013. For example, the crop species count decreased significantly from 4.72 in 2012 to 3.21 in 2013 (p=0.000), although there was no significant change in the production diversity score variable over time.

There were also significant changes under the market access and participation category. Firstly, there was a significant decrease in the mean distance to markets in 2010-2011, 2.92 km, in comparison to 2011-2012, 1.44 km (p=0.000). The second significant difference was for a share of other food crops sold, where it decreased from 63.7 per cent to 48.1 per cent (p=0.000). Interestingly there was no change in the share of maize sold, which remained at a considerably lower percentage of around 9 per cent for both study rounds.

Under the category of external supports, the only variable that showed significant changes over the study period was the number of extension visits received. Results from the 2012 and 2013 study rounds show that households received a mean of 3.91 and 8.99 extension visits, respectively, the substantial increase in the number of visits in 2013 was statistically significant (p=0.000). In comparison to this, other external supports variables remained stable, with no significant changes over time.

For the final category, uptake of technology, the only variable that saw significant change between the two years was for the knowledge of crop management techniques. There was a statistically significant increase in the percentage of respondents who were aware of at least one technique to control aflatoxin which went from 27.2 per cent in 2012 to 55.4 per cent in 2013 (p=0.000). There was no significant change in the other two variables; use of improved maize seed and use of chemical fertiliser which remained above 80 per cent and 60 per cent respectively for the two years considered in the analysis.

There were numerous notable gendered differences under each of the four agricultural change process categories. For every one of these statistically significant differences, female-headed households were worse off than male-headed households. Under the category of production diversity, there were two instances of significant gendered differences. Firstly, there was a significant difference in the 2013 production diversity score where male-headed households (5.62) had a significantly greater production diversity score in comparison to female-headed households (4.48) (p=0.005). The second significant difference was in 2013, where male-headed households (3.39) had a significantly greater crop species count score than female-headed households (2.94) (p=0.044).

There were some interesting gendered differences found in the market access and participation category. When considering the distance to markets male-headed households travelled significantly further to sell their products in comparison to female-headed households, 3.26 km in comparison to 1.95 in the 2010-2011 season, which was statistically significant and 1.59 km in comparison to 1.16 km in the 2011-2012 season (2010-2011 p=0.028; 2011-2012 p=0.241). This correlated with findings from several focus group discussions around emerging trends in trading practices, for example, farm-gate selling, which female-headed households seem to favour for the sake of convenience and practicality, however, they questioned the opportunity cost of such practices. Regarding participation in markets, there was only one notable gendered difference that was statistically significant. In the 2011-2012 season, male-headed households sold 52.2 per cent of their other food crops, a significantly larger proportion than that of female-headed households who sold 41.7 per cent (p=0.041).

There were no notable gendered differences in the access to extension services and FISP support variables; however, there were some interesting differences detected in the association participation variables. Households could have been a member of an association for up to four years during the study; results showed that male-headed households were members for a mean of 2.72 years which was significantly larger than that of female-headed households who had a mean of 1.97 years (p=0.000). This was further investigated; results showed that 23 per cent of female-headed households were never a member of an association during the study period in comparison to 2 per cent of male-headed households. This indicates that there is some sort of barrier to female-headed households' access to associations. This could be due to local customs and norms or could be something more practical, like the likelihood that female-headed households have less time to participate in gatherings like trainings and farm exchange visits. Another possibility is the element of members receiving basic seed on credit which may be seen by female-headed households as something that is too risky to engage in considering their lower levels of financial and economic capital.

This gender disparity was also found in the uptake of the technology category. A statistically significant higher percentage of male-headed households planted hybrid maize in the 2012-2013 season (p=0.016). Likewise, in the 2012-13 season, a significantly higher percentage of male-headed households applied chemical fertiliser in comparison to female-headed; 75.0 per cent versus 54.4 per cent (2013 p=0.005).

Building on the exploration of the gendered differences in the employment of agricultural change processes, disaggregation of the results by the household asset score quartiles was carried out. Results showed that those in the lower asset quartiles have significantly worse results across most of the agricultural change processes in comparison to that of the households in the higher asset ownership quartiles.

Production diversity results indicated that the higher the asset score quartile, the greater the production diversity households achieve. This was the case for the production diversity score variable in 2012 and 2013, where Q1 households had the lowest production diversity scores, and for the crop species count variable in 2013.

Under the change process category of market access and participation, households in Q3 travelled the longest distance to markets in 2010-2011, 6.14 km in comparison to the shortest distance of 2.37 km for households in Q1. This may indicate that the better-off households are able to travel to markets and trading centres further away from their homestead to obtain better prices for their produce. This mirrors the earlier finding in relation to female-headed households and their limited access to markets in comparison to male-headed households. Regarding share of crops sold, only the share of maize sold variable showed significant differences between the asset quartile groups; in the 2012-2011 season, the higher asset score groups sold a larger share of their maize produced in comparison to the lower asset groups.

The differences found between the asset score quartiles under the external supports change process category further indicated that those with a lower level of asset ownership are faring worse in the employment of agricultural change processes. In both 2012 and 2013, households in the lowest asset quartile received the least number of extension service visits, whereas households in the third quartile received the highest number of visits (2012 p=0.000, 2012 p=0.011). However, despite this difference, there was no difference in the percentage of households who reported being members of an association at any time during the study period. Although when the number of years a household reported participating in an association was considered there were considerable differences found. The only asset score quartiles that reported having never been a member of an association during the study period were households from Q1 (16 per cent) and Q2 (3 per cent). Furthermore, the only households reporting one year of membership were again from Q1 (22 per cent) and Q2 (20 per cent). These findings indicate that female-headed households and households with lower levels of asset ownership are less likely to participate in and benefit from agricultural associations.

In contrast to these findings, households in the lower asset quartiles appear to have been more likely to benefit from FISP in the 2011-12 and 2012-13 seasons. In 2012 households from Q1 and Q2 represented 81.9 per cent of the sample that received FISP coupons with this increasing marginally to 85.6 per cent in 2012-2013. This finding is in line with the official FISP targeting criteria despite the long-running issues around targeting reported in the literature and discussed during focus groups and interviews (Chirwa and Dorward, 2013). Despite this finding, the lower asset score quartiles appear to be still worse off in comparison to the higher asset quartiles in terms of uptake of technology. Households in asset score Q1 and Q2 had the lowest percentage of households planting improved maize varieties in both seasons; these difference across the groups was significantly different (2011-2012 p=0.040; 2012-2013 p=0.036). This was also the case for use of chemical fertiliser (2011-2012 p=0.001; 2012-2013 p=0.005) and for knowledge of crop management techniques (2012 p=0.000; 2013 p=0.002).

Overall results show that the most vulnerable households utilized the studied agricultural change process significantly less than that of households that are better off from a gendered or asset ownership perspective. Households who were female-headed or with lower levels of asset ownership are more likely to have lower levels of production diversity, less access to markets, participate less in markets, have lower levels of agricultural technology uptake, and although they do have greater access to social protection in the form of FISP, they had less access to associations and extension services (i.e. external supports).

These differences are important to note, given the findings from the correlation analysis, which showed that HDDS and household asset scores were significantly associated with most of the agricultural change processes. Of the eleven agricultural change process variables explored the most consistently and strongly correlated variables were; production diversity score variable, association participation, FISP support, chemical fertiliser use and knowledge of crop management techniques.

Further investigation using standard multiple regression showed that both HDDS and household asset scores were strongly and positively influenced by the production diversity score variable in 2012 and 2013. Total income received from crops sold, an indicator of market participation, positively influenced all three-dependent variables in both years signifying the importance of crop production as a livelihood strategy. The use of chemical fertiliser was only found to influence asset ownership in 2012 and had no significant influence on either of the food security variables. Interestingly, access to extension services influenced the HFIAS in both 2012 and 2013 but showed no influence on the other two dependent variables.

Chapter 8: Conclusion

This chapter summarizes the main findings of the research and their implications for policy, future research and recommendations. Food security and poverty reduction remain a major policy priority for many countries like Malawi.

While agriculture has long been promoted as a remedy for reducing poverty and hunger, especially in nations where much of the population is engaged in the agricultural sector, there is no consensus as to what that agricultural system would look like for a region or country. In saying this, many actors advocate for the importance of the role of 'smallholder farming' as it is believed to be responsible for a considerable share of the global food production, and accounts for a large share of food consumed in Africa and Asia (Lowder, Skoet and Raney, 2016).

Agriculture, poverty reduction and food security are inextricably linked. Gaining an understanding of how these links can be stimulated is essential. For Malawi, it would be valuable to gain an insight into how policy interventions are utilized within the smallholder livelihood system, and how the design and implementation of these interventions can influence food security and poverty outcomes.

In recent times, agricultural policy in Malawi has mainly been focused on increasing rain-fed crop production, primarily through the renowned Farm Input Subsidy Programme (FISP). Analysis in the literature shows that the budget allocation to the FISP programme causes crowding out of other supports that have the potential of contributing to the smallholder agriculture sector and rural development, for example, extension support, development of irrigation infrastructure, financial services, or tailored social protection initiatives. All of which could be gender sensitive to ensure the most vulnerable households benefit.

The main aim of this thesis was to provide substantial insight into how different livelihood components and supports provided, influence key indicators of food security and livelihood systems in Malawi. To achieve this aim, research objectives and research questions were constructed; these are outlined in Chapter 1. To answer these research questions quantitative and qualitative data from three districts across

Malawi's central region was used. Descriptive statistics, statistical significance tests, correlation and multiple regression analysis, were employed to answer the five research questions. The following three sections summarize the major findings of the study and their implications.

Livelihoods Overtime

To investigate the livelihood system over time the study looked at household demographics, health, land ownership and use, access to water and sanitation, livestock ownership, access to financial services, the main livelihood strategies employed, and the context of vulnerability and gender equality.

Some positive changes include, the proportion of households reporting experiencing illness in the past month declined, which from 82.1 per cent in 2010 to 59.5 per cent in 2013. However, female-headed households had a significantly worse mean illness score in comparison to male-headed households, in 2012 and 2013.

There was increased access to protected wells and hand pumps which more than doubled from 40 per cent in 2010 to 88 per cent in 2013, with no significant gendered difference in access. Access to sanitation, namely latrines, started from a high base of 87 per cent. This decreased slightly but remained high at 83 per cent in 2013.

These promising figures around access to improved water and sanitation facilities are likely to have the most significant impact on women and girls, considering that they are primarily responsible for the collection and treatment of water. Although it is not possible to make a link between the reduction in the mean illness score and the improved water and sanitation, it is possible to assume that along with increased access to safer drinking water, women and girls are likely spending less time taking care of household members who fall ill from waterborne illnesses.

Another positive trend was how more households were likely to own livestock at the end of the study. The percentage of those owning no livestock at all dropped from 30.8 per cent in 2010, to the lowest point of 21.0 per cent in 2012. Considering that repeatedly in FGDs, livestock was referred to as a form of saving to be used in case of emergency shows that during the study period most households were able to build up a buffer of some sort. The preference in the types of livestock owned remained consistent over the four years with chickens always being the most popular, followed by goat, pig and cattle.

Land constraints remained persistent throughout the study. The mean land ownership and land cultivated over the four years remained stable over the four years ranging slightly above 1 hectare. In all study rounds, apart from 2010, female-headed households both owned and cultivated a significantly smaller area of land.

Over the study period, maize was by far the predominant crop with most of the sample cultivating it each year. Groundnut was the second most common crop grown: over 75 per cent of households cultivated groundnuts throughout the study. Farmers appear to have shifted away from the cultivation of tobacco and cotton and toward the cultivation of legumes. This was explored in FGDs where farmers explained that they were shifting their preference to legume-based cash crops. Some reasons for this included how markets for the alternative cash crops were viewed as being less volatile in comparison to the tobacco auction floor prices; the alternative crops also meant that farmers were less reliant on expensive chemical inputs and appreciated the soil fertility benefits from using legumes.

Although there were no significant differences in what crops male-headed households chose to cultivate in comparison to female-headed households, there were a number of times when male-headed households were able to cultivate a significantly larger area of crops in comparison to female-headed households, for example for maize in 2012-13, for groundnut in 2011-12, for tobacco in 2012-13. Key barriers that female-headed households likely faced in comparison to male-headed households include limited labour availability, limited land entitlements, and affordability of inputs, and the opportunity cost of carrying out casual/ganyu labour at critical times in the cropping calendar.

Maize yields showed signs of decline over the study period, especially for female-headed households, and were at their worst in the final study round 2012-13 which was attributed to poor weather, 'extremely high' fertiliser prices, and the price of maize grain during the lean season was more than double the 2012 prices (FEWSNET, 2013).

Despite challenges around maize production, groundnut yields increased significantly over the study period going from 480kg/ha in 2008-09 to 882kg/ha in 2012-13. Likely contributing factors for this include the increased availability of improved seed through the groundnut purchasing scheme, training received from ExAgris Africa Ltd., increased market demand and the inclusion of groundnut seed in the FISP coupon package.

Regarding crop sales, groundnut was the most common crop sold over the study period showing upward trends in popularity as a cash crop. The mean quantity of groundnuts sold by households in 2008-09 was 122kg, each year this increased, with a significant overall increase to 211kg in the 2011-12 season. The mean amount of the other main crops sold remained largely stable over the study period.

Year on year, there was a significant increase in the total mean amount of income earned from all crop sales. The total mean income earned went from 14,775 MWK in 2008-09 to 43,379 MWK in 2010-11. This increased again to 50,537 MWK in 2011-12. However, these figures should be considered with caution as during this period the country was experiencing unprecedented inflation resulting in the currency being devalued against the US dollar by 34 percent in 2012. Nonetheless, each year male-headed households earned a greater mean income from crop sales in comparison to female-headed households, in 2008-09 this difference was significant.

The main source of income in the study areas for households was crop production. However, casual labour and non-agricultural enterprises were also important sources at various stages of the seasonal calendar. In response to the question of how this has changed over the last five years (i.e. 2009-2013), focus group participants discussed how crop production is less profitable than it was before as inputs are more expensive and the prices received at the market are poor – despite the data showing increases in mean income received from crop sales. The growing popularity of non-agricultural enterprises shows how households, that invest, are beginning to diversify their livelihood strategies; although the reliability and impact of these small-scale businesses and casual labour are questionable due to the precarious and seasonal nature of such activities. The scalability of these enterprises is also questionable, considering the lack of appropriate financial services in the study area.

The percentage of households gaining an income from paid work fluctuated over the study period with from 36 to 53 per cent. The most common type of paid employment or work reported over the four years was agricultural. Casual agricultural labour, known locally as 'ganyu' labour, is the most common type of paid work in rural Malawi, especially for subsistence farming households, and is an important income source often used as a coping strategy. A decline in the prevalence of sorting and packing of tobacco has been replaced with construction, showing again, the reducing dominance of the tobacco economy in the study area.

The proportion of households owning non-agricultural enterprises increased from 28 per cent to 32 per cent. Petty trading, small-scale groceries and the making and selling of baked goods were the most common types of enterprises owned by households. Focus group discussion participants stressed that the profits made from a small business were minimal, making only enough to cover the running costs and contribute to some basic household expenditures (e.g. purchasing soap, salt, educational fees).

It is evident that the studied households pursued their livelihoods strategies within a context of recurrent hazards. There was a wide variety of shocks reported each year. The three most common shocks reported were; lower crop yields due to drought or floods, illness or accident involving a household member, and death of a household member. There were no notable differences in shocks experienced by male-headed households in comparison to female-headed households. Most household shocks occur between January and May, during the lean season, the time of year when households are most vulnerable. Every year the occurrence of shocks drop-off in July, harvest time, but begins to steadily increase later in the year. Every year the most common response was to do nothing. Many households reported they were unable to do anything because they had no resources, lacked labour or they felt that the shock was outside of their control (e.g. failed rains). Other common responses included spending savings, despite the lack of financial services in the area and turning to casual labour or to work more.

Household access to savings grew almost three-fold over the study period, increasing from 15.1 per cent in 2010 to 46.2 per cent in 2013. Male-headed households were significantly more likely to have access to savings in comparison to female-headed households. There was no significant change in the percentage of households accessing credit. Similarly, there were no significant differences in the percentage of male-headed households accessing credit in comparison to female-headed households.

The increase in the percentage of households accessing savings can be linked to the emergence of the 'Village Savings and Loans' groups (VSLs). The main reason for obtaining credit in 2013 was to purchase food for consumption with 30 per cent of households reporting this in comparison to 11 per cent in 2010. This is likely a risky coping strategy considering the volatility of food prices in Malawi. Both the mean amount saved and the mean amount of credit taken increased significantly over the study period. Every year male-headed households had saved and credited more than female-headed households. The mean percentage of interest charged on credit is taken out by households remained relatively stable over the study period at around 58 per cent.

For male-headed households decisions around crop production, sales, and consumption were largely dominated by male members; after that joint decision making was most common, then it was female decision making. Decisions around soya appear to have been the most inclusive or female-driven.

For female-headed households, the vast majority of decisions around the production, sale and consumption of maize, groundnuts and soya were made by female household members. There was more involvement of male-headed and other household members in decisions around the sale of tobacco and cotton. This difference for the two cash crops is likely due to the perceived higher value of these crops and the need to send the product to auction floors and central trading points.

For male-headed households, male members dominated the decision-making process for all livestock sales. However, for chickens, there was a relatively larger percentage, 24 per cent of households, with female-only decision making. Female members made all the decisions around the sale of chickens in female-headed households. Small percentages of female-headed households reported that other members made decisions in relation to the sale of goat and pig. Decision making around savings in male-headed households is predominately made by female members with 52 per cent of households reporting such. This is likely due to the increased prevalence of female-only VSLs.

There is a large, and increasing, proportion of the sample that is female-headed, increasing significantly from 35 per cent in 2010 to 41 per cent in 2013. This is a concerning trend considering the mean dependency ratio showed that female-headed households have less economically active household members available in comparison to male-headed households.

Food Security & Asset Ownership Over Time

Three dependent variables used to measure household level livelihood outcomes; these included the household asset score, Household Food Insecurity Access Scale (HFIAS) and Household Dietary Diversity Score (HDDS).

The overall household asset score fluctuated marginally, though not significantly over the study period. Most of the sample fell into the lowest asset quartile, with this percentage increasing to 56.9 per cent in 2013. Every year there was a higher proportion of female-headed households falling into the lowest quartile in comparison to male-headed households, this difference was statistically significant in 2011 and 2013.

Over the four years studied, 27.2 per cent of households increased their overall quartile positioning, however, the exact same percentage decreased, whilst 45.6 per cent saw no change in their position. This shows that despite there being considerable variability in asset ownership at the household level, it was not significant enough to impact on larger more substantial change.

The four HFIAS categories' results showed that the percentage of 'severely food insecure' households decreased, a positive indication of the food security situation. In the comparable years, the percentage decreased from 35.9 per cent in 2011 to 33.3 per cent in 2012 and again to 30.8 per cent in 2013. The mildly and moderately food insecure categories appear to show similar trends that indicate that households moved more into the 'food secure' category over the study period.

With regard to the HDDS, the overall mean fluctuated but not significantly over the study period. There were only two food groups that were consistently consumed over the study period: cereals and the spices, condiments and beverages group.

Two differences found in the results suggest that male-headed households have more access to animal proteins in comparison to female-headed households. In 2011, 2012 and 2013 male-headed households were more likely to have consumed meat and meat products in comparison to female-headed households. Similarly, in 2012 and 2013, male-headed households were more likely to have consumed eggs in comparison to female-headed households.

When differences in household food security results were disaggregated by the asset score quartiles, important differences were evident. For HFIAS, the higher asset score quartile, the better the HFIAS score. So much so that in 2013, the worst year for food security, the mean HFIAS for those in Q1 was 7.23 in comparisons to 1.75 for those in Q4, the lowest HFIAS score in any year, in any quartile. This trend is mirrored with the HDDS.

A correlation analysis run found that, apart from 2010, there were statistically significant relationships between HDDS, HFIAS and the household asset score. Broader correlation analysis found a wide variety of independent variables that had either a statistically positive or negative relationship with the asset score, HFIAS and HDDS over the study years. Some variables that had consistently positive relationships across all variables included: total value of crops sold, maize yields, household head education. One negative relationship that appeared numerous times over the four years with all three variables was paid work. This is likely since the poorest households are more reliant on casual labour (i.e. ganyu) in order to meet basic needs. Therefore, those who are more likely to be carrying out paid work are the ones who have worse results in their asset scores, HFIAS and HDDS.

Finally, the multivariate regression analysis was carried out. The regression models included independent variables that were found to have some level of a statistically significant relationship with the independent variables over the study period. Some notable variables that were found to have a significant influence on the asset score, HFIAS and HDDS were: land ownership, livestock value, total crops sold, district, household education, savings, and ownership of an enterprise.

These findings are crucial to understanding what household characteristics and livelihood strategies influence food security and asset ownership outcomes. From the findings, it can be assumed that male-headed households are better off in terms of asset ownership, food security and are less vulnerable to shocks. In terms of livelihood strategies, crop production for sale and livestock ownership appear to be the main strategies that have a positive influence on household asset ownership and food security; however casual labour appears to have a negative influence. Considering the seasonal nature of the demand for casual labour, peaking during the planting and harvesting season, the relationship it has with household food security is undoubtedly very strong.

Agricultural Change Processes Influencing Food Security & Asset Ownership

Four agricultural change process categories were created based on previous studies and the Malawian policy at the time of the study. These categories were production diversity, market access and participation, external supports, and uptake of agricultural technology. Under each of these categories, eleven independent variables in total were designed and analysed. Three lines of enquiry were pursued for each of the eleven variables; change over time, gender differences, and differences across wealth groups as measured by the asset score quartiles.

When considering the aspect of change over time, results showed that all four agricultural change process categories had at least one variable that showed a significant change between 2012 and 2013. For example, the crop species count decreased significantly from 4.72 in 2012 to 3.21 in 2013 (p=0.000), although there was no significant change in the production diversity score variable over time.

There were also significant changes under the market access and participation category. Firstly, there was a significant decrease in the mean distance to markets in 2010-2011, 2.92 km, in comparison to 2011-2012, 1.44 km (p=0.000). The second significant difference was for share of other food crops sold, where it decreased from 63.7 per cent to 48.1 per cent (p=0.000). Interestingly there was no change in the share of maize sold, which remained at a considerably lower percentage of around 9 per cent for both study rounds.

Under the category of external supports, the only variable that showed significant changes over the study period was the number of extension visits received. Results from the 2012 and 2013 study rounds show that households received a mean of 3.91 and 8.99 extension visits, respectively. The substantial increase in the number of visits in 2013 was statistically significant (p=0.000). In comparison to this, other external supports variables remained stable, with no significant changes over time.

For the final category, uptake of technology, the only variable that saw significant change between the two years was for the knowledge of crop management techniques. There was a statistically significant increase in the percentage of respondents who were aware of at least one technique to control aflatoxin which went from 27.2 per cent in 2012 to 55.4 per cent in 2013 (p=0.000). There was no significant change in the other two variables; use of improved maize seed and use of chemical fertiliser which remained above 80 per cent and 60 per cent respectively for the two years considered in the analysis.

There were numerous notable gendered differences under each of the four agricultural change process categories. For every one of these statistically significant differences, female-headed households were worse off than male-headed households.

Under the category of production diversity, there were two instances of significant gendered differences. Firstly, there was a significant difference in the 2013 production diversity score where male-headed households (5.62) had a significantly greater production diversity score in comparison to female-headed households (4.48) (p=0.005). The second significant difference was in 2013, where male-headed households (3.39) had a significantly greater crop species count score than female-headed households (2.94) (p=0.044).

There were some interesting gendered differences found in the market access and participation category. When considering distance to markets male-headed households travelled significantly further to sell their products in comparison to female-headed households, 3.26 km in comparison to 1.95 in the 2010-2011 season, which was statistically significant and 1.59 km in comparison to 1.16 km in the 2011-2012 season (2010-2011 p=0.028; 2011-2012 p=0.241). This correlated with findings from the three focus group discussions with association members (Annexe 5, Tool 2) around emerging trends in trading practices, for example, farm-gate selling, which female-headed households seem to favour for the sake of convenience, practicality, and although not mentioned explicitly, likely reduced personal risk. Despite these positives, female participants questioned the opportunity cost of such practices. Regarding participation in markets, there was only one notable gendered difference that was statistically significant. In the 2011-2012 season, male-headed households sold 52.2 per cent of their other food crops, a significantly larger proportion than that of female-headed households who sold 41.7 per cent (p=0.041).

There were no notable gendered differences in access to extension services and FISP support variables. However, there were some interesting differences detected in the association participation variables. Households could have been a member of an association for up to four years during the study; results showed that male-headed households were members for a mean of 2.72 years which was significantly larger than that of female-headed households who had a mean of 1.97 years (p=0.000). This was further investigated; results showed that 23 per cent of female-headed households were never a member of an association during the study period in comparison to 2 per cent of male-headed households.

This gender disparity was also found in the uptake of technology category. A statistically significant higher percentage of male-headed households planted hybrid maize in the 2012-2013 season (p=0.016). Likewise, in the 2012-13 season, a significantly higher percentage of male-headed households applied chemical fertiliser in comparison to female-headed; 75.0 per cent versus 54.4 per cent (2013 p=0.005). This difference is likely contributing to the gendered disparities in maize yields as shown in Chapter 5, Table 21.

Building on the exploration of the gendered differences in the employment of agricultural change processes, disaggregation of the results by the household asset score quartiles was carried out. Results showed that those in the lower asset quartiles have significantly worse results across most of the agricultural change processes in comparison to that of the households in the higher asset ownership quartiles.

Production diversity results indicated that the higher the asset score quartile, the greater the production diversity households achieve. This was the case for the production diversity score variable in 2012 and 2013, where households in the lowest asset quartile Q1 had the lowest production diversity scores, and for the crop species count variable in 2013.

Under the change process category of market access and participation, households in Q3 travelled the longest distance to markets in 2010-2011, 6.14 km in comparison to the shortest distance of 2.37 km for households in Q1. This may indicate that the better-off households are able to travel to markets and trading centres further away from their homestead to obtain better prices for their produce. This mirrors the earlier finding in relation to female-headed households and their limited access to markets in comparison to male-headed households. Regarding share of crops sold, only the share of maize sold variable show significant differences between the asset quartile groups; in the 2012-2011 season, the higher asset score groups sold a larger share of their maize produced in comparison to the lower asset groups.

The differences found between the asset score quartiles under the external supports change process category further indicated that those with a lower level of asset ownership are faring worse in the employment of agricultural change processes. In both 2012 and 2013, households in the lowest asset quartile received the least number of extension service visits, whereas households in the third quartile received the highest number of visits (2012 p=0.000, 2012 p=0.011). However, despite this difference, there was no difference in the percentage of households who reported being members of an association at any time during the study period. Although when the number of years a household reported participating in an association was considered there were considerable differences found. The only asset score quartiles that reported having never been a member of an association during the study period were households from Q1 (16 per cent) and Q2 (3 per cent). Furthermore, the only households reporting one year of membership were again from the lowest asset quartile Q1 (22 per cent) and Q2 (20 per cent). These findings indicate that female-headed households and households with lower levels of asset ownership are less likely to participate and benefit from agricultural associations.

In contrast to these findings, households in the lower asset quartiles appear to have been more likely to benefit from FISP in the 2011-12 and 2012-13 seasons. In 2012 households from Q1 and Q2 represented 81.9 per cent of the sample that received FISP coupons with this increasing marginally to 85.6 per cent in 2012-2013. This finding is in line with the official FISP targeting criteria despite the long-running issues reported in the literature and discussed during focus groups and interviews (Chirwa and Dorward, 2013). Regardless, the lower asset score quartiles appear to be still worse off in comparison to the higher asset quartiles in terms of uptake of technology. Households in asset score Q1 and Q2 had the lowest percentage of households planting improved maize varieties in both seasons; these difference across the groups was significantly different (2011-2012 p=0.040; 2012-2013 p=0.036). This was also the case for use of chemical fertiliser (2011-2012 p=0.001; 2012-2013 p=0.005) and for knowledge of crop management techniques (2012 p=0.000; 2013 p=0.002).

Overall results show that households who were female-headed or with lower levels of asset ownership were more likely to have lower levels of production diversity, less access to markets, participate less in markets, have lower levels of agricultural technology uptake, and although they did have greater access to social protection in the form of FISP, they had less access to associations and extension services (i.e. external supports).

These differences are important to note, given the findings from the correlation analysis, which showed that HDDS and household asset scores were significantly associated with most of the agricultural change processes. Of the eleven agricultural change process variables explored the most consistently and strongly correlated variables were production diversity score variable, association participation, FISP support, chemical fertiliser use and knowledge of crop management techniques.

Further investigation using standard multiple regression showed that both HDDS and household asset scores were strongly and positively influenced by the production diversity score variable in 2012 and 2013. Total income received from crops sold, an indicator of market participation, positively influenced all three-dependent variables in both years signifying the importance of crop production as a livelihood strategy. The use of chemical fertiliser was only found to influence asset ownership in 2012 and had no significant influence on either of the food security variables. Interestingly, access to extension services influenced the HFIAS in both 2012 and 2013 but showed no influence on the other two dependent variables.

Smallholder Agriculture as a Pathway for Food Security and Livelihood Transition

Smallholder agriculture is an essential livelihood strategy for rural development. Findings from this study confirm that the choices a household makes, together with the activities they carry out to determine their livelihood strategies, generate their means for survival (Ellis, 2000; cited by Kahsay, 2017). However, the productivity of a household's livelihood system is largely dependent on their level of vulnerability, access to and returns from capital assets, and access to PIPs that support and enable smallholders. In Chapter 2, Dorward*'s* concept of households either hanging in, stepping up and stepping out, was introduced. The primary livelihood strategy pursued by the studied population is crop production, supplemented to varying levels with livestock holdings, small-scale enterprises and casual labour. Most households fell into the lowest asset ownership quartile, 56.9 per cent in 2013, and as mentioned, there was some variability in asset ownership at the household level, however not significant enough to impact larger more substantial shifts in the proportions falling into the upper quartiles. It can be assumed that most households were 'hanging in' as they maintained key livelihood assets and engaged in livelihood activities as described in Chapter 5. Meanwhile, they faced repeated idiosyncratic shocks and were vulnerable to wider climate and market related shocks. Livelihood decisions for these households were likely to have been focused on the short term.

The remainder of the study sample could be categorised as 'stepping up'. These households were the ones who consistently fell into the third and fourth asset ownership quartiles, which would account for between 5 and 10 per cent of the overall sample. Although the main livelihood strategy for these households was also crop production, results in Chapter 7 showed that they were the households that had considerably better crop productivity in terms of output, diversity and income gained. It was also evident that through higher levels of asset ownership, these households were able to invest in assets to expand activities, with the aim of increasing production and income to improve their overall livelihoods in the medium term. However, like the households who were 'hanging in', the 'stepping up' households were also vulnerable to the same idiosyncratic, climate and market-related shocks. They may have had a greater capacity to absorb these shocks; however, they had similar if not the same limited anticipatory and adaptive capacity as their neighbouring households. Thus, in the event of consecutive shocks, they were vulnerable to falling back into the 'hanging in' category. It is unlikely that any of the studied households fell into the 'stepping out' category.

Considering all this, the role of smallholder agriculture as a viable pathway for food security and overall livelihood improvements should not be taken as a given. Results from Chapter 7 showed that the majority of the eleven agricultural change processes employed for crop production were positively associated with food security and asset ownership. Income received from crops sold, positively influenced all food security and asset ownership variables in all years analysed. This shows that although the studied smallholder agriculture system is proving to have an important impact on the livelihood outcomes of households, it is not significant enough to ensure longer-term progression. This leads to the question of the role of rural development policy and practice.

Key Events Since the Study Design

As outlined in Chapter 4, the design of the original research study took place in 2010, with the final data collection happening in 2013. Finally, the write-up and submission of this thesis happened in 2020. Since the initial study design, there have been numerous events that have had a direct impact on Malawi's political economy, which were acknowledged in Chapter 3.

There were numerous natural disasters and shocks included flooding, dry spells, droughts, Fall Army Worm infestation, El Niño and Cyclone Idai. All of these events are likely to have had a cumulative effect on smallholder farmers' capacity to prepare, respond and recover to such shocks.

All these natural disasters took place in a time where there was considerable political and economic instability. The centralised nature of Malawi's political system means that the three changes in the presidency (i.e. Bingu wa Mutharika 2004-2012, Joyce Banda 2012-2014, Peter Mutharika 2014-2020) over the last decade have come with considerable controversy. Confidence of foreign investors and international donors has been consistently low due to the mismanagement of long-running inflation and corruption.

This instability also distracts from embedding long term policies and strategies. The scale and frequency of the natural disasters Malawi experiences make the National

Agricultural Investment Plan (NAIP) (2018-2023), the National Resilience Strategy (2018 – 2030) and the Social Protection Strategy (2017 – 2022) more relevant than ever for the likes of the smallholder farmers who participated in this study.

Considering all this, the status of the smallholder farmers in this study will likely to have changed very little, and hopefully not have deteriorated. Also, it is highly probable that the findings and the recommendations of this thesis are still relevant.

Recommendations for Policy and Practice

It is not possible to discuss agricultural policy in Malawi without discussing the FISP, considering that still, to date, a large proportion of the budget and political discourse it consumes on an annual basis. This study showed that chemical fertilizer use did positively influence asset ownership in 2012. However, there is a lack of any substantial evidence that shows if participation in the FISP influenced household food security. Although these findings do not imply direct cause and effect, they do show there are significant relationships or the lack thereof, which should not be dismissed. For example, how access to extension services positively influence the HFIAS in both 2012 and 2013. All of this strengthens the arguments presented in the literature around the need for a rebalancing of the agricultural budget. This does not mean there needs to be complete removal of fertilizer subsidisation. However, there needs to be a significant level of reallocation of resources towards complimentary seasonal or shock-sensitive social protection interventions, agricultural supports like extension services through youth employment initiatives and the use of technology for information sharing. In particular, the provision of seasonal social protection to households who are engaging in causal labour that negatively impacts food security and asset ownership outcomes could have a substantial impact on seasonal food crisis and the resulting negative coping strategies like low paid casual labour. This could be especially beneficial for female-headed households and households that fell into the lowest asset quartile. Appropriate social protection could increase the chance of these vulnerable households graduating from the level 'hanging in' to 'stepping up' and so forth. A lot of such interventions have been proposed in the National Agricultural

Investment Plan (NAIP) (2018-2023), the National Resilience Strategy (2018 – 2030) and the Social Protection Strategy (2017 – 2022). However, comprehensive budget allocations and implementation are not coming into fruition.

Unfortunately, it is unlikely that the FISP will be depoliticised in the coming years, meaning that the governments' reactionary market interventions like the export bans and the set minimum farm gate prices, as outlined in Chapter 3, will remain a feature of Malawi's post-harvest, lean season. None of this is conducive to protecting against the increased frequency of climate-related shocks that will continue to put Malawi's agricultural system under severe pressure. The knock-on effect this has on livelihood systems, and the national food security situation is likely to result in large numbers of people requiring food assistance for more extended periods of time.

However, a lot can be learned around this by using existing research on what change processes consistently contribute to improving livelihood outcomes. In this study, production diversity, participation in markets, access to extension services and the use of chemical fertilizer were proven to positively influence either food security or asset ownership. By building on these findings and previous studies, investment in research that accounts for seasonality would help clarify why in some years there were correlations and relationships, but in others, there were not. Studies that consider seasonality would also give insight into what are the common shocks and stresses that are preventing households from consistently increasing their livelihood outcomes (i.e. food security and asset ownership), especially in the case of female-headed households.

Using learning from such studies can inform the design of the FISP, but also gender sensitive extension services, social protection programmes, public work programmes, food and nutrition prevention and mitigation responses. All such initiatives have been long established in Malawi; however, all are managed by different government ministries and offices and are highly politicised.

In the last decade there has been a growing interest around building resilience to climate change by developing a long-term cross-sectoral, multi-stakeholder national resilience programme, similar to initiatives like the Scaling Up Nutrition (SUN) movement – there is an opportunity to use studies like this to inform such initiatives. The aim of a programme like this would be to guide all sectors and stakeholders in their efforts to develop their respective systems; from the national to the community level. Thus, leading to more cohesive systems that are more adaptive to the changing climate, and have the capacity to adsorb and anticipate the inevitable shocks and stresses. Such a programme could be guided by, if in part, by the livelihood systems framework as presented in this study.

Contribution to the Academic Literature and Future Research

This research is specific to the central region of Malawi; however, the methods employed, and key findings can inform studies of a similar nature. The thesis contributes to the existing literature with an in-depth analysis of a smallholder agriculture livelihood system and the resulting food security and asset ownership outcomes. The opportunities for analysis with the original research study dataset pushed the boundaries set by previous livelihood studies. Specifically, by analysing and extensively testing the statistical significance of trends over time, along with the differences between gender and asset ownership quartiles. The thesis also investigated specific change processes that were being promoted through the policies, intuitions and processes (PIPs) in the study area, all of which are promoted to some degree in other developing countries across the world. This ensured that the study did not succumb to the common risk that comes with the Livelihoods Framework whereby each component of the framework is analysed in isolation (Levine, 2014). The design of the conceptual framework for this study ensured that the feedback loops and dynamic nature of livelihood systems were investigated and presented. This design can be used as a valuable example for other studies, especially those that are examining the concept of resilience.

As discussed in Chapter 2, there is an increased focus on systems strengthening programming in the development sector, especially focusing on building resilience to climate change. With this has come a resurgence of interest in the livelihoods framework and its adaption to develop complex resilience measurement indices. As Ifejika Speranza, Wiesmann and Rist (2014) noted, resilience thinking is implicit in the Sustainable Livelihoods approaches. By increasing the focus on resilience in the conceptual framework used in this study, there is considerable potential for increasing the understanding of livelihood dynamics, and how households maintain and enhance their livelihoods in the face of change (e.g. shocks and stresses).

Additionally, future research could do a more in depth analysis of household expenditures, individual household members' food consumption (e.g. by gender or age of household member), and other aspects that may give a more nuanced insight into the nutritional status of households and their members. Although the HDDS and HFIAS were incorporated in the analysis, future studies may consider broadening the number of food and nutrition security variables to ensure a complete picture of the food security situation over time. These additional variables could include the Coping Strategy Index, Food Consumption Score, the child level Dietary Diversity Score and child anthropometry.

Longitudinal studies are becoming more commonly used in the research and impact evaluation field, and the benefits are evident from this study; however, an additional seasonal aspect to a longitudinal study would prove very beneficial, especially in contexts like Malawi where seasonality has such an impact on households. Also, research studies like this would benefit from a more nuanced qualitative-quantitative iterative investigation pattern. As noted in the limitations outlined in Chapter 4, limited qualitative data was available from the first two years of this study and the third and fourth years were primarily focused on the original research study's lines of enquiry. Future studies could benefit from increased investment into the qualitative component of longitudinal studies. Smaller cohorts of the sample could be selected for a quarterly, or bi-annual semi-structured interview that would capture key variables for the quantitative survey and qualitative open-ended questions in relation to the participants' experiences and reflections on their livelihoods. A 'Stories of Change' methodology could be applied to corroborate and humanise the extensive quantitative dataset, thus increasing the likelihood of influencing target audiences (Gillespie and van den Bold, 2017b).

This study used the household as the main unit of measurement, which came with limitations around exploring inter-household inequalities as discussed in Chapter 4. These limitations can be mitigated or avoided completely in future research, for example, by ensuring a mixed-method approach that includes lines of enquiry that are specifically targeted at individual household members (e.g. mothers, children under 5, adolescent girls, elderly). For studies similar to this, there would be considerable benefits from including the Women's Dietary Diversity Score, or Child's Dietary Diversity Score, either instead or with the Household Dietary Diversity Score (Leroy *et al.*, 2015; Aberman, Meerman and Benson, 2018). Alternatively, if the study is focusing more on the aspect of gender equality and in agricultural livelihood systems, the use of the well-established Women's Empowerment in Agriculture Index (WEAI), a gender parity index that compares the empowerment of men and women from the same households (e.g. husband and wife) (Gupta *et al.*, 2019; Malapit *et al.*, 2019; Colverson *et al.*, 2020).

In addition to this, by ensuring that the qualitative lines of enquiry are designed in a way that recognises the limitations of quantitative data collection, there is potential to dig deeper into the socio-economic and cultural structures and norms that influence household livelihood systems.

In conclusion, the main findings presented in this thesis suggest that more research is required to gain a better understanding of what drives livelihood trends over time and how seasonality impacts on livelihood strategies, change processes and subsequent livelihood outcomes. This may support better design of policies and programmes targeting food security and poverty reduction.

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Annexe 1: Statistical Tables

Table 86: P-Values for Asset Quartile Groups Tests for Significant Change over Time (McNemar's Test)

	2010 vs. 2011	2011 vs. 2012	2012 vs. 2013	2010 vs. 2013
Q1	0.752	0.892	0.021	0.101
Q2	0.744	0.906	0.328	0.115
Q3	0.134	0.701	1.000	0.523
Q4	1.000	0.424	0.302	0.815

Table 87: P-Values for Asset Quartile Group Test for Significant Differences in Gender of Household Head by Assets Score Quartile (Fisher's Exact Probability Test)

	2010	2011	2012	2013
Q1	0.098	0.017	0.266	0.001
Q2	0.148	0.958	0.901	0.008
Q3	0.481	0.004	0.362	0.923
Q4	0.514	0.717	0.530	0.200

Table 88: Households Consuming Each HDDS Food Group McNemar's Test P-values

	2010 vs. 2011	2011 vs. 2012	2012 vs. 2013	2010 vs. 2013
Cereals	-	-	-	1.000
Roots and Tubers	0.000***,***	0.000***	0.152	0.000***
Vegetables	1.000	1.000	1.000	1.000
Fruits	0.000***	1.000	0.653	0.000***
Meat and Meat Products	0.000***	0.738	1.000	0.000***
Egg	0.000***,***	0.020	0.207	0.000***
Fish	0.000***	0.403	0.001***	0.000***,***
Pulses	-	-	0.036**	0.000**
Milk and Milk Products	0.000***	0.154	0.018**	0.000**,***
Oils and Fats	0.000***	0.464	0.000***	0.000***,***
Sweets	0.000***	0.117	0.082	0.000***
Spices, Condiments and Beverages	0.125	1.000	0.012	0.424

*** significant at 1%, ** significant at 5%, * significant at 10%

Table 89: Households Consuming Each HDDS Food Group by Gender of Household Head

Chi-Square Tests P-Values

	2010	2011	2012	2013
Cereals	0.594	-	-	0.736
Roots and Tubers	0.653	0.557	0.017	0.404
Vegetables	0.333	0.537	0.693	0.736
Fruits	0.121	1.000	0.032	0.288
Meat and Meat Products	0.436	0.023	0.001	0.009
Egg	1.000	0.097	0.043	0.003
Fish	0.051	0.026	0.447	0.150
Pulses	0.732	-	1.000	1.000
Milk and Milk Products	0.207	0.225	0.171	0.963
Oils and Fats	0.917	0.017	0.379	0.515
Sweets	0.073	0.314	0.143	0.827
Spices, Condiments and Beverages	0.744	0.723	0.597	0.105

Table 90: Agricultural Change Process Variables Correlation Coefficients 2012

	Production diversity score	Crop species count	Distance to markets (km)	Share of maize sold	Share of other food crops sold	Access to extension services	Association participation	FISP support	Improved maize varieties	Chemical fertilizer use	Post-harvesting processing knowledge
Production diversity score	1.000	0.124*	0.030	.262***	.262***	.223**	.290***	.258***	.164**	.251***	.338***
Crop species count	0.124*	1.000	-0.099	0.054	-0.050	0.155*	0.118	0.058	-0.023	0.029	0.054
Distance to markets (km)	0.030	-0.099	1.000	0.011	-0.002	.234**	.169**	-0.020	.162**	0.132	0.026
Share of maize sold	.262***	0.054	0.011	1.000	-0.018	0.017	0.106	.165**	0.087	0.122*	0.105
Share of other food crops sold	.262***	-0.050	-0.002	-0.018	1.000	0.011	0.116	0.053	0.010	0.023	0.099
Access to extension services	.223**	0.155*	.234**	0.017	0.011	1.000	0.143	0.110	0.049	0.082	.212**
Association participation	.290***	0.118*	.169**	0.106	0.116	0.143	1.000	0.132**	0.100	0.097	.353***
FISP support	.258***	0.058	-0.020	.165**	0.053	0.110	0.132*	1.000	.174**	.400***	0.105
Improved maize varieties	.164**	-0.023	.162**	0.087	0.010	0.049	0.100	.174**	1.000	.756***	0.068
Chemical fertilizer use	.251***	0.029	0.132	0.122*	0.023	0.082	0.097	.400***	.756***	1.000	0.095
Post-harvesting processing knowledge	.338***	0.054	0.026	0.105	0.099	.212*	.353***	0.105	0.068	0.095	1.000
Coefficient strength; small r=.10 to .29, medium r=.30 to .49, large r=.50 to 1.0; *** significant at 1%, ** significant at 5%, * significant at 10%											

Table 91: Agricultural Change Process Variables Correlation Coefficients 2013

	Production diversity score	Crop species count	Distance to markets (km)	Share of maize sold	Share of other food crops sold	Access to extension services	Association participation	FISP support	Improved maize varieties	Chemical fertilizer use	Post-harvesting processing knowledge
Production diversity score	1.000	.766***	0.111	.141**	0.136**	.192**	.391**	.169**	.316***	.362***	.416***
Crop species count	.766***	1.000	0.131*	0.126*	0.027	.205**	.389**	.170**	.354***	.378***	.422***
Distance to markets (km)	0.111	0.131	1.000	-0.026	0.025	-0.006	0.132*	-0.012	0.081	.164**	0.068
Share of maize sold	.141**	0.126*	-0.026	1.000	0.121	0.020	0.071	0.096	0.125*	.149**	0.061
Share of other food crops sold	0.136*	0.027	0.025	0.121	1.000	-0.157*	0.052	0.076	0.090	0.113	0.058
Access to extension services	.192**	.205**	-0.006	0.020	-0.157*	1.000	.240***	0.134	0.032	0.075	0.083
Association participation	.391***	.389***	0.132*	0.071	0.052	.240***	1.000	0.102	0.135*	.291***	.337***
FISP support	.169**	.170**	-0.012	0.096	0.076	0.134	0.102	1.000	.169**	.363***	0.119
Improved maize varieties	.316***	.354***	0.081	0.125*	0.090	0.032	0.135*	.169**	1.000	.661***	.172*
Chemical fertilizer use	.362***	.378***	.164**	.149**	0.113	0.075	.291***	.363***	.661***	1.000	.241***
Post-harvesting processing knowledge	.416***	.422***	0.068	0.061	0.058	0.083	.337***	0.119*	.172**	.241***	1.000

Coefficient strength; small r=.10 to .29, medium r=.30 to .49, large r=.50 to 1.0; *** significant at 1%, ** significant at 5%, * significant at 10%

Table 92: Independent Variables Correlation Coefficients 2010

	Lilongwe	Mchinji	Salima	HH Sex	HH Size	Illness Score	Savings	Credit	Land Owned	Enterprise	Paid Work	Livestock Total Value	Total Crops Sold	Maize Yield	Groundnut Yield
Lilongwe	1.000	-.535**	-.471**	-0.031	-.166*	0.071	0.087	0.077	-.205**	.154*	0.105	-0.013	.217**	.190**	.350**
Mchinji	-.535**	1.000	-.493**	0.050	0.125	-0.063	-0.132	-0.090	.364**	-0.113	0.028	-0.081	-.222**	-.190**	-.242**
Salima	-.471**	-.493**	1.000	-0.020	0.041	-0.007	0.047	0.015	-.172*	-0.041	-0.137	0.094	0.004	0.002	-0.104
HH Head Sex (m/f)	-0.031	0.050	-0.020	1.000	-.241**	0.100	-.162*	-0.038	-0.056	0.013	0.013	-0.093	-.177*	0.044	0.053
HH Size	-.166*	0.125	0.041	-.241**	1.000	-0.054	-0.030	0.047	.160*	-0.055	-0.127	0.140	-0.052	-0.125	-0.036
Illness Score	0.071	-0.063	-0.007	0.100	-0.054	1.000	-0.025	0.045	0.038	-0.089	0.036	-0.125	-0.034	-0.033	0.138
Savings (y/n)	0.087	-0.132	0.047	-.162*	-0.030	-0.025	1.000	0.027	-0.115	.209**	-0.094	0.048	.235**	0.064	-0.143
Credit (y/n)	0.077	-0.090	0.015	-0.038	0.047	0.045	0.027	1.000	-0.004	-0.001	.145*	-0.039	0.063	-0.015	0.061
Land Owned (ha)	-.205**	.364**	-.172*	-0.056	.160*	0.038	-0.115	-0.004	1.000	-0.082	-0.071	.305**	-0.014	-0.038	0.075
Enterprise (y/n)	.154*	-0.113	-0.041	0.013	-0.055	-0.089	.209**	-0.001	-0.082	1.000	0.013	0.120	-.173*	0.119	0.136
Paid Work (y/n)	0.105	0.028	-0.137	0.013	-0.127	0.036	-0.094	.145*	-0.071	0.013	1.000	-0.066	-.209**	0.049	-0.048
Livestock Total Value (MWK)	-0.013	-0.081	0.094	-0.093	0.140	-0.125	0.048	-0.039	.305**	0.120	-0.066	1.000	-0.016	.189*	0.157
Total Crops Sold (MWK)	.217**	-.222**	0.004	-.177*	-0.052	-0.034	.235**	0.063	-0.014	-.173*	-.209**	-0.016	1.000	0.028	0.012
Maize Yield (kg/ha)	.190**	-.190**	0.002	0.044	-0.125	-0.033	0.064	-0.015	-0.038	0.119	0.049	.189*	0.028	1.000	.400**
Groundnut Yield (kg/ha)	.350**	-.242**	-0.104	0.053	-0.036	0.138	-0.143	0.061	0.075	0.136	-0.048	0.157	0.012	.400**	1.000

Table 93: Independent Variables Correlation Coefficients 2011

	Lilongwe	Mchinji	Salima	HHH Sex	HHH Age	HHH Education	HH Size	HH Dependency Ratio	Illness Score	Shocks Reported	Savings	Credit	Land Owned	Enterprise	Paid Work	Livestock Total Value
Lilongwe	1.000	-.535**	-.471**	-0.115	-.159*	0.035	-.167*	-0.084	-0.033	0.085	0.116	.185**	-.159*	.230**	-0.011	0.010
Mchinji	-.535**	1.000	-.493**	0.038	0.048	0.013	.249**	.147*	0.031	.150*	-.166*	-0.088	.243**	-0.127	.158*	0.032
Salima	-.471**	-.493**	1.000	0.079	0.114	-0.050	-0.088	-0.067	0.002	-.244**	0.054	-0.098	-0.091	-0.104	-.153*	-0.043
HH Head Sex (m/f)	-0.115	0.038	0.079	1.000	.184*	-.353**	-.212**	.148*	0.082	0.076	-0.061	0.017	-.186*	-0.047	0.065	-.307**
Household Head Age	-.159*	0.048	0.114	.184*	1.000	-.394**	0.085	-0.046	0.010	-0.042	-0.136	-0.042	0.068	-0.095	-0.057	0.020
Household Head Education	0.035	0.013	-0.050	-.353**	-.394**	1.000	0.136	-0.091	-0.100	-0.041	.153*	0.060	.177*	0.115	-0.042	.272**
HH Size	-.167*	.249**	-0.088	-.212**	0.085	0.136	1.000	.234**	0.135	0.002	-0.131	0.059	.354**	0.067	0.124	.272**
Household Dependency Ratio	-0.084	.147*	-0.067	.148*	-0.046	-0.091	.234**	1.000	0.039	0.084	-0.110	-0.016	-0.135	-0.122	0.099	-.211*
Illness Score	-0.033	0.031	0.002	0.082	0.010	-0.100	0.135	0.039	1.000	0.017	0.023	.142*	0.069	0.022	0.094	0.088
No. of Shocks Reported (1-3)	0.085	.150*	-.244**	0.076	-0.042	-0.041	0.002	0.084	0.017	1.000	-0.018	.153*	-0.031	0.048	0.084	-0.143
Savings (y/n)	0.116	-.166*	0.054	-0.061	-0.136	.153*	-0.131	-0.110	0.023	-0.018	1.000	.262**	0.028	.364**	-0.062	0.120
Credit (y/n)	.185**	-0.088	-0.098	0.017	-0.042	0.060	0.059	-0.016	.142*	.153*	.262**	1.000	0.073	.160*	0.009	0.008
Land Owned (ha)	-.159*	.243**	-0.091	-.186*	0.068	.177*	.354**	-0.135	0.069	-0.031	0.028	0.073	1.000	0.070	-0.085	.355**
Enterprise (y/n)	.230**	-0.127	-0.104	-0.047	-0.095	0.115	0.067	-0.122	0.022	0.048	.364**	.160*	0.070	1.000	-0.062	0.147
Paid Work (y/n)	-0.011	.158*	-.153*	0.065	-0.057	-0.042	0.124	0.099	0.094	0.084	-0.062	0.009	-0.085	-0.062	1.000	-0.146
Livestock Total Value (MWK)	0.010	0.032	-0.043	-.307**	0.020	.272**	.272**	-.211*	0.088	-0.143	0.120	0.008	.355**	0.147	-0.146	1.000

Table 94: Independent Variables Correlation Coefficients 2012

	Lilongwe	Mchinji	Salima	HHH Sex	HHH Age	HHH Education	HH Size	HH Dependency Ratio	Illness Score	Shocks Reported	Savings	Credt	Land Owned	Enterprise	Paid Work	Livestock Total Value	Total Crops Sold	Maize Yield	Gnut Yield
Lilongwe	1.000	-.535**	-.471**	-0.137	-0.072	-0.058	-.168*	-0.011	-0.090	0.120	0.083	.188**	-.364**	-0.061	0.003	-0.097	0.054	0.118	.188*
Mchinji	-.535**	1.000	-.493**	0.105	-0.041	-0.077	0.093	0.026	-0.012	-0.025	-0.137	-0.133	.300**	-0.108	-0.064	-0.120	-0.113	-0.074	-.229**
Salima	-.471**	-.493**	1.000	0.032	0.117	0.139	0.075	-0.016	0.105	-0.097	0.057	-0.056	0.063	.176*	0.063	.220**	0.067	-0.044	0.054
HHH Sex	-0.137	0.105	0.032	1.000	.148*	-.246**	-.211**	0.094	.174*	-0.002	0.003	0.041	-0.030	-0.048	-0.011	-0.069	-.240**	-0.055	0.014
HHH Age	-0.072	-0.041	0.117	.148*	1.000	-.347**	0.047	-0.100	0.063	0.103	-0.005	-0.111	0.137	-0.025	-0.060	0.119	-0.095	-0.134	-0.021
HHH Education	-0.058	-0.077	0.139	-.246**	-.347**	1.000	.142*	-0.127	-0.100	-0.022	0.130	0.020	.175*	0.130	-0.048	0.148	.282**	0.136	-0.013
HH Size	-.168*	0.093	0.075	-.211**	0.047	.142*	1.000	.321**	0.024	0.053	-0.008	-0.087	.196**	0.014	0.027	.215**	0.131	0.071	-0.126
HHDependency Ratio	-0.011	0.026	-0.016	0.094	-0.100	-0.127	.321**	1.000	0.062	-0.003	-.156*	0.003	-0.009	-0.033	0.031	-0.144	-.185*	-0.038	-0.054
Illness Score	-0.090	-0.012	0.105	.174*	0.063	-0.100	0.024	0.062	1.000	0.037	-0.113	0.072	-0.076	-0.087	0.105	0.021	-0.051	-0.067	-0.060
No. of Shocks Reported (1-3)	0.120	-0.025	-0.097	-0.002	0.103	-0.022	0.053	-0.003	0.037	1.000	0.121	0.110	0.034	0.080	0.134	0.124	-0.087	-.283**	0.056
Savings (y/n)	0.083	-0.137	0.057	0.003	-0.005	0.130	-0.008	-.156*	-0.113	0.121	1.000	.172*	.155*	.251**	-0.081	.276**	.268**	.254**	.250**
Credit (y/n)	.188**	-0.133	-0.056	0.041	-0.111	0.020	-0.087	0.003	0.072	0.110	.172*	1.000	-0.064	0.024	0.106	-0.003	0.076	0.008	-0.002
Land Owned	-.364**	.300**	0.063	-0.030	0.137	.175*	.196**	-0.009	-0.076	0.034	.155*	-0.064	1.000	0.095	-.172*	.242**	.341**	0.124	-.166*
Enterprise	-0.061	-0.108	.176*	-0.048	-0.025	0.130	0.014	-0.033	-0.087	0.080	.251**	0.024	0.095	1.000	-0.080	.161*	-0.018	0.007	0.014
Paid Work	0.003	-0.064	0.063	-0.011	-0.060	-0.048	0.027	0.031	0.105	0.134	-0.081	0.106	-.172*	-0.080	1.000	-0.073	-0.078	-.216**	-0.011
Livestock Total Value	-0.097	-0.120	.220**	-0.069	0.119	0.148	.215**	-0.144	0.021	0.124	.276**	-0.003	.242**	.161*	-0.073	1.000	.400**	0.144	0.146
Total Crops Sold	0.054	-0.113	0.067	-.240**	-0.095	.282**	0.131	-.185*	-0.051	-0.087	.268**	0.076	.341**	-0.018	-0.078	.400**	1.000	.440**	0.129
Maize Yield	0.118	-0.074	-0.044	-0.055	-0.134	0.136	0.071	-0.038	-0.067	-.283**	.254**	0.008	0.124	0.007	-.216**	0.144	.440**	1.000	.177*
Groundnut Yield	.188*	-.229**	0.054	0.014	-0.021	-0.013	-0.126	-0.054	-0.060	0.056	.250**	-0.002	-.166*	0.014	-0.011	0.146	0.129	.177*	1.000

Table 95: Independent Variables Correlation Coefficients 2013

	Lilongwe	Mchinji	Salima	HHH Sex	HHH Age	HHH Education	HH Size	HH Dependency Ratio	Illness Score	Shocks Reported	Savings	Credit	Land Owned	Enterprise	Paid Work	Livestock Total Value	Total Crops Sold	Maize Yield	Gnut Yield
Lilongwe	1.000	-.535**	-.471**	-0.105	-0.091	-0.051	-0.110	0.047	-0.062	0.054	-0.032	-0.046	-.268**	.142*	0.045	-0.081	0.103	-0.140	.229**
Mchinji	-.535**	1.000	-.493**	0.123	-0.006	-0.117	0.037	-0.009	0.022	-0.048	-0.028	0.028	.273**	-.214**	0.081	-0.090	-0.020	0.126	0.022
Salima	-.471**	-.493**	1.000	-0.021	0.100	.175*	0.074	-0.038	0.041	-0.005	0.062	0.018	-0.008	0.077	-0.131	.174*	-0.087	0.013	-.270**
HHH Sex (m/f)	-0.105	0.123	-0.021	1.000	.238**	-.388**	-.275**	-0.078	.146*	0.076	-.177*	-0.030	-.156*	-.180*	0.098	-.209*	-.158*	-.227**	-0.142
HHH Age	-0.091	-0.006	0.100	.238**	1.000	-.348**	-0.019	-.270**	.174*	.172*	-0.123	-0.001	0.109	0.076	0.056	0.131	-.194*	-0.139	-.295**
Household Head Education	-0.051	-0.117	.175*	-.388**	-.348**	1.000	.269**	0.124	-0.087	0.062	.282**	.167*	0.143	0.108	-.177*	0.160	.326**	.312**	.173*
HH Size	-0.110	0.037	0.074	-.275**	-0.019	.269**	1.000	.304**	0.031	0.049	.281**	.229**	.341**	.277**	0.058	.318**	.252**	.260**	0.140
HH Dependency Ratio	0.047	-0.009	-0.038	-0.078	-.270**	0.124	.304**	1.000	-0.055	-0.024	-0.004	-0.117	-.252**	-0.011	0.071	-0.076	-0.007	-0.127	-0.023
Illness Score	-0.062	0.022	0.041	.146*	.174*	-0.087	0.031	-0.055	1.000	.189**	-.279**	0.029	-0.001	-0.006	.285**	-0.023	-.196*	-.205**	-.380**
No. of Shocks Reported (1-3)	0.054	-0.048	-0.005	0.076	.172*	0.062	0.049	-0.024	.189**	1.000	.152*	.293**	0.031	.151*	.204**	0.099	-0.045	0.093	-0.050
Savings (y/n)	-0.032	-0.028	0.062	-.177*	-0.123	.282**	.281**	-0.004	-.279**	.152*	1.000	.315**	.254**	.264**	-0.073	0.134	.322**	.394**	.279**
Credit (y/n)	-0.046	0.028	0.018	-0.030	-0.001	.167*	.229**	-0.117	0.029	.293**	.315**	1.000	.293**	.154*	-0.042	.214*	.260**	.250**	0.043
Land Owned (ha)	-.268**	.273**	-0.008	-.156*	0.109	0.143	.341**	-.252**	-0.001	0.031	.254**	.293**	1.000	0.075	-0.089	.469**	.445**	.601**	0.033
Enterprise (y/n)	.142*	-.214**	0.077	-.180*	0.076	0.108	.277**	-0.011	-0.006	.151*	.264**	.154*	0.075	1.000	-0.037	0.128	0.139	0.108	0.126
Paid Work (y/n)	0.045	0.081	-0.131	0.098	0.056	-.177*	0.058	0.071	.285**	.204**	-0.073	-0.042	-0.089	-0.037	1.000	-0.094	-.233**	-.209**	-0.149
Livestock Total Value (MWK)	-0.081	-0.090	.174*	-.209*	0.131	0.160	.318**	-0.076	-0.023	0.099	0.134	.214*	.469**	0.128	-0.094	1.000	.321**	.537**	0.017
Total Crops Sold (MWK)	0.103	-0.020	-0.087	-.158*	-.194*	.326**	.252**	-0.007	-.196*	-0.045	.322**	.260**	.445**	0.139	-.233**	.321**	1.000	.549**	.272**
Maize Yield (kg/ha)	-0.140	0.126	0.013	-.227**	-0.139	.312**	.260**	-0.127	-.205**	0.093	.394**	.250**	.601**	0.108	-.209**	.537**	.549**	1.000	.324**
Groundnut Yield (kg/ha)	.229**	0.022	-.270**	-0.142	-.295**	.173*	0.140	-0.023	-.380**	-0.050	.279**	0.043	0.033	0.126	-0.149	0.017	.272**	.324**	1.000

Annexe 2: Consumer Price Index

Deflating Nominal Values to Real Values using Malawi's National Statistical Office Annual Consumer Price Index			
	Price Index	Re-indexed to 2010	Decimal form
2010	281.9	100.00	1.00
2011	300.0	106.41	1.06
2012	356.8	126.58	1.27
2013	446.2	158.28	1.58

Annexe 3: Food Groups Employed for Diversity Variables

Food Group	Foods Included for HDDS	Crops Included for Production Diversity Score
1. Cereals	Maize, rice, wheat, sorghum, millet or any other grains or foods made from these (e.g. bread, buns/scones, porridge, nshima, mandazi)	Scores 1 if they cultivate; Maize, rice
2. Roots and tubers	Irish potato, cassava, or other foods made from roots	Scores 1 if they cultivate; Irish potato, Cassava
3. Vegetables	Pumpkin, carrot, squash, or sweet potato that are orange inside, pepper, dark green leafy vegetables, including wild forms, cassava leaves, pumpkin leaves, rape, spinach, tomato, onion, okra, and other locally available vegetables	Scores 1 if they cultivate; Pumpkin, carrot, squash, pumpkin leaves, dark green leafy vegetables, cassava leaves, pumpkin leaves, rape, tomato, onion, okra, etc.
4. Fruits	Mango, papaya, banana, citrus fruits, other fruits, including wild fruits and 100% fruit juice	Scores 1 if they cultivate; Mango, papaya, Mango, papaya, banana, citrus fruit trees
5. Meat	Pork, lamb, goat, rabbit, game, chicken, duck, other birds, insects or other organ meats or blood-based foods	Scores 1 if they own; pig, sheep, goat, cattle, chicken, or other poultry
6. Egg	Eggs from chicken, duck, guinea fowl or any other egg	Scores 1 if they own; chicken, or other poultry
7. Fish	Fresh or dried fish	No data available to determine this
8. Legumes, nuts and seeds	Beans, peas, lentils, nuts, seeds or foods made from these (e.g. peanut butter)	Scores 1 if they cultivate; beans, peas, lentils, nuts, sunflower, etc.
9. Milk and milk products	Milk, cheese, yoghurt or other milk products	Scores 1 if they own; sheep, goat, cattle
10. Oils and fats	Oil, fats or butter added to food or used for cooking	NA
11. Sweets	Sugar, honey, soda or sweetened juice drinks, sugary foods such as chocolates, candies, cookies and cakes	Sugar cane
12. Spices, condiments and beverages	Spices (black pepper, salt), condiments (soy sauce, hot sauce), coffee, tea, alcoholic beverages	NA

Annexe 4: Field Work Schedule 2013

Activity	Location	Week Commencing												
		Wk 1 27-May	Wk2 03-Jun	Wk3 10-Jun	Wk4 17-Jun	Wk5 24-Jun	Wk6 01-Jul	Wk7 08-Jul	Wk8 15-Jul	Wk9 22-Jul	Wk10 29-Jul	Wk11 05-Aug	Wk12 12-Aug	Wk13 19-Aug
Arrival in Country	Lilongwe	✓												
Field Work Prep	Lilongwe	✓												
Meet Key stakeholders	Lilongwe	✓												
Meet Enumerators	Lilongwe	✓												
Arrange transport for field work	Lilongwe	✓												
Training of Enumerators	Lilongwe & Lisungwi		✓											
Field Test Quest & Enumerators	Lisungwi		✓											
Edits to Quest & Evaluation of Enumerators	Lilongwe		✓	✓										
Data Collection	Lisungwi			✓										
Data Collection	Mchinji				✓									
Data Collection	Salima					✓								
Finalise Data Collection Activities	Locations 1,2,3						✓							
Plan for qualitative data collection	Lilongwe							✓						
Supervisors visit	Lilongwe							✓	✓					
Annual meetings w/Stakeholders & Qualitative data collection	Lilongwe & Locations 1,2,3								✓					
Qualitative data collection	Lilongwe & Locations 1,2,3									✓	✓	✓	✓	
Wrap up & depart	Lilongwe & Locations 1,2,3										✓	✓	✓	✓

Annexe 5: Qualitative Data Collection Tools

Tool 1: Community Representatives Focus Group Discussion

General Topics & Wealth Breakdown

District	Village(s)	Number of participants Total _______ Men ______ Women ______
Interviewers	Date	

NB: Participants should include head farmers, association members, and other farmers. Note, those involved in this focus group should not be also involved in the household questionnaires to avoid survey fatigue.

Procedures:

1. **Introduce** the team and explain the **objectives** of the assessment.
2. Ask the community leaders or representatives to give you an **overview** of the situation in the community.
3. Explain the reference year of **APRIL 2011 to APRIL 2012** we are collecting data.

CROP PRODUCTION

Main food & cash crops (dry harvest without green consumption)	Unit of land	Yield/unit in APRIL 2011 – APRIL 2012 **With Inputs**		Yield/unit in APRIL 2011 – APRIL 2012 **Without Inputs**		Average Seed requirement, unit and source of seed
		Season 1	***Season 2***	***Season 1***	***Season 2***	

What Proportion of the population uses inputs? ____

Where do they source their inputs? ____

MARKETS (APRIL 2011 – APRIL 2012)

MARKET PRICE DATA	Description of ITEM	MARKET where bought or sold	UNIT OF MEASURE	LOW PRICE	Low price MONTH	HIGH PRICE	High price MONTH
Main food & cash crops	*e.g. Maize*	*Mitundu*	*e.g. acre*	*MWK 800*	*May*	*MWK 1500*	*January*
Main types of livestock							
Other Include: expenditure items (e.g. cooking oil, salt, meat, eggs); income items (e.g. firewood bundles)							

<u>LABOUR</u>: Where do people go to find casual work?

Seasonal Calendar (April 2011 - April 2012)													
	Apr-11	May-11	Jun-11	Jul-11	Aug-11	Sep-11	Oct-11	Nov-11	Dec-11	Jan-12	Feb-12	Mar-12	Apr-12
MAIN SEASON													
Indicate what activity was carried out at what time for each crop: Weeding (W), planting (P), fertilizing (F), irrigation (I), harvesting (H), sorting (S), drying (D), storage (S), consumption (C), sales (S), etc...													
Crop 1:													
Crop 2:													
Crop 3:													
Crop 4:													
WINTER SEASON													
Crop 1:													
Crop 2:													
Crop 3:													
Crop 4:													
OTHER													
Consumption of Food (Purchased, own production, relief, food for work, etc...)													
Ganyu labour, casual labour, migration for work													
Hunger Season													
Shocks													
RAINFALL PATTERN													

HAZARDS

TIMELINE: Include ***positive events*** as well as ***periodic or intermittent hazards from baseline year of 2010 to current year 2012.***

Seasonal Performance (1-5*)		**Event(s)** *(e.g. Drought,, floods, frost, wind, epidemic crop or livestock disease, market events)*	**Response**: What did people do themselves to cope with the problem? Was there any outside assistance?
Dry 2010			
Wet 2010			
Dry 2011			
Wet 2011			
Dry 2012			
Wet 2012			

*** Rank** all the seasons relative to each other:
5 = an excellent season for household food security (e.g. due to bumper yields, good rains, good prices, etc)
4 = a good season or above average season for household food security
3 = an average season in terms of household food security
2 = a below average season for household food security
1 = a poor season (e.g. due to drought, flooding, pest attack) for household food security

Please rank the three main *chronic hazards* affecting households in this area. (Note: A chronic hazard is one that significantly affects crop or livestock production almost every year.)
1.
2.
3.

WEALTH GROUP DESCRIPTIONS AND BREAKDOWN

Wealth groups: local definitions and names (local language)		Group 1:	Group 2:	Group 3:	Group 4:
Wealth group name (English)					
Household size - Minus those living away + Plus those from other households					
Land **owned** (grazing + crop, including cash crop)					
Land **rented** in / out					
Land **cultivated** (owned +/- rented land)	Total area				
	Food crops area				
	Cash crops area				
Main crops grown for sale					
Main crops grown for food					
Livestock: Cattle owned	Total (range)				
	Prod. Females				
	Plough oxen				
Goats owned	Total (range)				
	Prod. Females				
Sheep owned	Total (range)				
	Prod. Females				
Chickens owned:					
Other livestock:					

Wealth groups: local definitions and names (local language)	Group 1:	Group 2:	Group 3:	Group 4:
Other livestock:				
Other causes of differences in production (e.g. quality of land, access to irrigation, labour, ag. inputs etc.)				
Other productive household assets (e.g. ploughs, irrigation, trees, hives, fishing equipment)				
Main **sources of cash income**, ranked Checklist of cash income sources:				
- Agricultural labour - Other casual labour (e.g. construction) - Paid domestic work - Salaried employment	- Remittances - Firewood collection or charcoal burning - Collection and sale of wild foods - Mining	- Crop sales - Vegetable sales - Brewing - Petty trade (small-scale trade)	- Trade (large scale) - Small business - Fishing - Transport (e.g. taxi, pick-up)	
Months of consumption from own harvest				
Bad year response strategies				
Schooling levels attained by children				
% of households in each wealth group (proportional piling)				
Main **constraints** and development **priorities** →				

Tool 2: Association Members Focus Group Discussion

FOCUS GROUP DISCUSSION	
Target Group:	Association Members Only
Topic:	Crop Production as a Livelihood Crash Cropping and Groundnuts Association Membership
District:	
Village:	
Date:	
No. Of Participants (m/f):	

❖ ***Crop Production as a Livelihood***

1. Has farming become harder, easier or stayed the same over the past 5 years, why so?

2. How do you decide which crops to plant?

3. Have markets in the area improved/worsened/stayed the same over the past 5 years, why so?

4. Where are the fairest prices found?

5. Where are the most unfair prices found?

6. When selling crops are prices negotiable, if so, which crops and which buyers?

7. Do you know how much it costs to produce your crops?

    - If yes, what costs are included?
    - If not, how do you negotiate a minimum price?

❖ ***Cash Cropping and Groundnuts***

1. What stops you from growing more maize or more crops for sale?

2. At what level do farmers have to be able to hire ganyu labour?

3. What are the main objectives when growing groundnuts (i.e. food, cash, seed, soil fertility)?

4. What do farmers prefer to sell UNSHELLED or SHELLED;

5. What do farmers think of the new technologies and techniques they have learned (IN RELATION TO ALL CROPS)

    - Are they important; why so?

❖ ***Inputs***

1. What has happened to the price of inputs over the past 5 years?

2. Which inputs have farmers reduced or stopped buying due to prices rises in recent years?

3. What are the benefits and what are the risks associated with buying fertilizer?
    - Benefits:
    - Risks:

4. When can't households afford inputs, what are the alternatives?

❖ ***FISP***

1. Who has been able to receive FISP support? (PROBE – What? How? Impact? Any issues?)

2. What is the availability of improved/certified seed and fertilizer like?
    - Fertilizer;
    - Seed;
3. What would you change about FISP?

❖ ***Association Membership***

1. What is the association doing to help?

2. What kind of new cropping techniques have they learnt?

3. What techniques do they find most beneficial?

4. What benefits does an association member gain that a non-member doesn't?

5. Is the association stronger than it was in previous years?

6. What needs to be done to develop the association?

❖ **Closing Remarks (for each group)**

1. What are their hopes for the future?

2. What would they like to see change?

Tool 3: Female Only Focus Group Discussion

FOCUS GROUP DISCUSSION	
Target group:	Female Only Group
Topics:	Activities throughout crop production Cash flow of households and ganyu Income and expenditure matrix Credit Available
District:	
Village:	
Date:	
No. Of Participants:	

1. Activities throughout crop production

- Descriptions of activities and who it involves from clearing and preparation of plots all the way to post-harvesting processing and sales
    - Include decision making processes and roles and responsibilities of household members

2. Cash Flow of Households and Ganyu

- Has households standard of living improved/worsened or stayed the same over the last 5 years?
- What time of year are households most likely to sell off assets to meet cash needs, and why?
- What other activities are employed to meet cash needs at this time of year?
- Are there any other ways a household could use to meet the cash needs?
- What effect do ganyu/casual labour/piece works have on the farming activities of households?
    - Is it helpful to farming because it generates cash that can be used to buy inputs or make investments?
    - Is it unhelpful to farming because it means that people are doing other things and cannot pay attention to the farm?

3. Income and Expenditure Matrix

- What are the most important sources of income in the community, both cash and in-kind?

Sources of Income (Cash and In-Kind)	**Female-Headed Household (proportional piling)**	**Male Headed Household (proportional piling)**	**Months**
Add rows as needed...			

- How do women's sources of income compare to men's?

- Which expenditures are typical to almost everyone?

Expenditures	Female-Headed Households	Male Headed Households	Months
Add rows as needed...			

- For female-headed households and male-headed households, what proportion of income is spent on basic needs like food, clothing, housing, health care and education?

- Who can save?

- How do women's expenditures compare to men's?

4. Credit Available

- What has happened to credit institutions and availability over the past five years?

- Has the source of credit changed?

- Is it more difficult or less difficult to obtain credit than before?

- What are the alternatives to credit?

5. Closing Remarks (for each group)

- What are their hopes for the future?

- What would they like to see change?

- **Comments and observations from FGD**
- What was good:
- What was difficult:
- Conclusions:

Tool 4: Village Heads Focus Group Discussion

Focus Group Discussion Village Heads	
Topics:	General Changes in the Area Summary Wealth Ranking Institutions in the Area
District:	
Villages Represented: (also ask for no. Of HHs per village)	
Date:	
No. Participants (m/f):	

❖ ***General Changes in the Area and Farming***

1. What are the main things that have been changing in their villages over the past five years?

2. Have there been any changes in the sources of income in the past 5 years?

    - What is no longer a source/a new source/a source that is relied on more than previously

3. Has farming had become easier/harder/stayed the same over the past five years or so?
4. What is land availability like in the area?
5. What are the main problems in terms of land?
6. Who is less likely of gaining access to extra land if they required it?

Institutions in the Area

Use flip chart

No	Institutions	Activities	Rating	Comments
1				
2				
3	Add rows as needed…			
4= Extremely Important to the community; 3=Important to the community; 2 = Not so important to the community; 1= Not important at all to the community				

Summary Wealth Ranking

Use flip Chart

	Poorest	Average	Better-to-do/rich
Household size			
Land owned			
Land rented in / out			
Main crops grown			
Cattle owned			
Goats owned			
Sheep owned			
Chickens Owned			
Other causes of differences in production			
Type of house			
% of households in each wealth group (proportional piling)			
Have any of these groups got bigger or smaller in the past 5 years? **Other comments:**			

Tool 5: Key Informant Interview

District	Date	Interviewer(s)

DETAILS OF KEY INFORMANTS

Name	Position

DESCRIPTION OF STUDY AREA

	Study Area	
Estimated population		
Main Livelihood Category		
Main Characteristics (production system, topography, vegetation, natural resources, population density, soils, rainfall)		
Main Crops Consumed: Rank in order of importance for home consumption	1	
	2	
	3	
Main Crops Sold (food or cash crops): Rank in order of importance for household cash income	1	
	2	
	3	
Main Livestock & Livestock Products Consumed: Rank in order of importance for home consumption	1	
	2	
	3	
Main Livestock & Livestock Products Sold: Rank in order of importance for cash income	1	
	2	
	3	

MARKETS

Identify the main source and destination markets for each product, together with the names of any important intermediate markets to indicate a trade route (e.g. local markets -> Mitundu -> Lilongwe)

Main crops sold	**Trade route**
1.	
2.	
3.	

Main livestock sold	**Trade route**
1.	
2.	
3.	

Main foods bought when own stocks run out	**Trade route**
1.	
2.	

Market Access

Is market access good or bad in this area?	
Why? (e.g. good/bad roads, close to/far from an urban centre)	

LABOUR

How much of the total casual labour performed by people from the area is undertaken in different locations (e.g. 70% local rural area, 20% local towns, 10% outside of zone)

Local rural area	Local towns	Outside area	Total
			100%

If outside area, where do people go?

HAZARDS

TIMELINE: Include ***positive events*** as well as ***periodic or intermittent hazards from the baseline year of 2010 to the current year 2012.***

Seasonal Performance (1-5*)		**Event(s)** *(e.g. Drought,, floods, frost, wind, epidemic crop or livestock disease, market events)*	**Response**: What did people do themselves to cope with the problem? Was there any outside assistance?
Dry 2010			
Wet 2010			
Dry 2011			
Wet 2011			
Dry 2012			
Wet 2012			

* **Rank** all the seasons relative to each other:
5 = an excellent season for household food security (e.g. due to bumper yields, good rains, good prices, etc.)
4 = a good season or above-average season for household food security
3 = an average season in terms of household food security
2 = a below-average season for household food security
1 = a poor season (e.g. due to drought, flooding, pest attack) for household food security

Please rank the three main *chronic hazards* affecting households in this area. (Note: A chronic hazard is one that significantly affects crop or livestock production almost every year.)
1.
2.
3.

INTERVENTIONS

OTHER TYPES OF INTERVENTIONS

Have there been any other types of interventions in the livelihood zone (e.g. government, NGO, or UN programmes)? Are programmes currently underway? Are there any planned for the future? Note where, when, and by whom these in interventions have taken place.

Tool 6: Market Visits & Trader Interview

District	Market/Town	Date	Interviewers

Name of Trader:					
How long have you been trading?					
What transport do you have access to?					
Max storage capacity:					
Member of trader or farmer association?					
Main communication technology:					
Other main income (other than trade):					
Petty trader, Retailer or Wholesaler?					
Classification of relative size	Smallest	Small	Medium	Large	Largest
Competition (when buying) (# traders)					

REFERENCE YEAR:	
Commodities traded	
Rank most important commodities traded; Explain any seasonal variation in the *type* of commodities traded	(1) (2) (3)
Main supplier(s) of major commodity:	
Was there much fluctuation in *supply*? If yes, the main reasons for fluctuation	
Main customers for this commodity:	

Was there much fluctuation in *demand*? If yes, main reasons for fluctuation in demand	
Trading Operations	
Means of transport of goods to market? (explain any seasonal difference)	
Access to market information: what, source, how reliable is it?	
Market Regulation & Government intervention	
Which market regulations influence your business?	
Does the government intervene in the market? If so, how?	
Marketing Constraints and Opportunities	
Main marketing constraints in reference year; and now	
Which commodities will have good future demand?	
Which are the most lucrative markets	

MARKET PRICE DATA

	Description of Item	Unit of measurement	Price post-harvest		Price pre-harvest	
			2012	2013	2012	2013
Main food & Cash crops						
Main types of livestock & livestock products						
Other: Basic goods, (salt, oil, firewood, charcoal), Durable goods (plastic wares, mats)						

Annexe 6: Informed Consent Script

Hello my name is ______ and I am from ________.

Since 2010 Valid Nutrition has been assessing the effect of assured markets (e.g. groundnut markets) on livelihoods and food security. Your household was selected either because you are a member of a farmers' association OR you were selected randomly by extension workers and your local leaders.

All the information you give is treated in COMPLETE CONFIDENCE and your name will not be used unless specific permission is given by you. Your information will only be used to assess the effects of the current markets on your livelihoods - i.e. no commercial exploitation by Valid Nutrition.

You can choose not to answer any questions and you can stop the interview at any time. All of your responses is confidential.

This interview should take approximately one hour. Would you like to ask me anything else about the survey?

- ☐ Yes (proceed with survey)
- ☐ No (do not proceed with survey, reassure and thank participant. Then move to the next household on the list)

Annexe 7: Household Survey

Question		Type	Answer option	
IDENTIFICATION - This section asks basic questions about the RESPONDENT'S age & status in the household etc...				
1.	Select Household ID from list	Single		
2.	District	Single	1	Lilongwe
			2	Mchinji
			3	Salima
3.	Name of respondent	Open		
4.	Sex of respondent	Single	1	Male
			2	Female
5.	Respondent's relationship to head of household	Single	1	Head
			2	Spouse
			3	Son/daughter
			4	Brother/sister
			5	Father/mother
			6	Son/daughter in law
			7	Orphan (below the age of 16)
			8	Orphan (above the age of 16)
			9	Grand child
			10	Other relative (specify)
BASIC HOUSEHOLD DEMOGRAPHICS - This section asks the respondent questions about the demographics of the household (*NOTE* YOU MUST INCLUDE ALL THE RESPONDENTS INFORMATION HERE ALSO)				
6.	Total number of people currently staying in the household (excluding visitors)? Recurring series of questions based on number entered here.	Numeric		(Min 1 - max 11)
7.	Household member [x]: Sex	Single	1	Male
			2	Female

Annexe 7: Household Survey

Question		Type	Answer option	
8.	Household member [x]: Age	Numeric		
9.	Household member [x]: Education in years	Numeric		
10.	Household member [x]: Are they economically active (i.e. contribute to the household income) if so, what do they do?	Single	1	Farmer
			2	Govt. Worker
			3	Soldier
			4	Skilled worker
			5	Market trader
			6	Small scale trader
			7	Casual labourer
			9	Student
			10	Other (specify)
			11	Not economically active
11.	Household member [x]: Relationship to household head	Single	1	Head
			2	Spouse
			3	Son/daughter
			4	Brother/sister
			5	Father/mother
			6	Son/daughter in law
			7	Orphan (below the age of 16)
			8	Orphan (above the age of 16)
			9	Grand child
			10	Other relative (specify)
Health - This section is in relation to the general health of the household over the LAST FOUR WEEKS				

Annexe 7: Household Survey

Question		Type	Answer option	
12.	How many if any of the household members were sick in the LAST FOUR WEEKS? Recurring series of questions based on number entered here.	Numeric		(Min 1 - max 11)
13.	Household member [x]: What was the illness?	Single	1	Fever/malaria
			2	Diahhorea/dysentery
			3	Stomach ache/vomiting
			4	Upper respiratory illness
			5	Lower respiratory illness
			6	Cholera
			7	Skin disorder (i.e. Rash wound/cut sores)
			8	Other (specify)
14.	Household member [x]: What action did you take to treat this illness?	Single	1	Nothing wasn't serious
			2	Nothing no money
			3	Visited a medical facility
			4	Used own remedy
			5	Purchased drugs from chemist/grocery store
			6	Traditional healer
			7	Other (specify)
15.	Household member [x]: Were they unable to perform their usual duties/tasks because of the illness?	Single	1	Yes - how many days
			2	No
16.	In the previous MONTH what was the household's total expenditure on medical costs. Please include all costs including all medical check-ups prescription and non-prescription drugs and transport for such?	Open		
17.	In the previous YEAR what was the household's total expenditure on medical costs. Please include all costs including all medical check-ups prescription and non-prescription drugs and transport for such?	Open		
18.	PROBING QUESTION: Is the respondent aware of HIV/AIDS?	Single	1	Yes

Annexe 7: Household Survey

Question		Type	Answer option	
			2	No
19.	Are there chronically ill physically challenged or mentally challenged persons in the household? (including HIV/AIDS)	Single	1	Yes
			2	No
20.	Number of chronically ill physically challenged or mentally challenged persons in the household?	Numeric		
Labour and Migration - This section is in relation to household members engaged in labour and migration.				
21.	How many household members were working in the PAST WEEK (e.g. full-time casual part-time ganyu)? Recurring series of questions based on number entered here.	Numeric		(Min 1 - max 11)
22.	Household member [x]: How many hours worked in past week?	Numeric		
23.	Household member [x]: What type of work?	Single	1	Agriculture
			2	Agriculture on ExAgris estate
			3	Guarding crops
			4	Performing household duties
			5	Sorting packing tobacco
			6	Tailoring
			7	School teacher
			8	Hospital attendant
			9	Small scale trading
			10	Construction
			11	Driver
			12	Collecting poles/cutting timber
			13	Other (specify)
24.	Household member [x]: What was the total payment received (include value of in-kind payments - MWK)?	Numeric		

Annexe 7: Household Survey

Question		Type	Answer option	
25.	How many household members moved away/migrated from the household to work in 2012? Recurring series of questions based on number entered here.	Numeric		(Min 1 - max 11)
26.	Migrated Household Member [x]: Relationship to household head	Single	1	Head
			2	Spouse
			3	Son/daughter
			4	Brother/sister
			5	Father/mother
			6	Son/daughter in law
			7	Orphan (below the age of 16)
			8	Orphan (above the age of 16)
			9	Grand child
			10	Other relative (specify)
27.	Migrated Household Member [x]: Location	Open		
28.	Migrated Household Member [x]: Were they away for…	Single	1	Permanently
			2	For a portion of the year
29.	Migrated Household Member [x]: How many weeks are they/were away for?	Numeric		
30.	Migrated Household Member [x]: What are they doing while they are away?	Single	1	Agricultural worker
			2	Government worker
			3	Soldier
			4	Skilled worker
			5	Market trader
			6	Small scale trader
			7	Casual labourer
			8	Jobless

Annexe 7: Household Survey

Question		Type	Answer option	
			9	Study
			10	Construction worker
			11	Driver
			12	Other
31.	Migrated Household Member [x]: How much money approx. Have them /do they send home while away.	Numeric		
Housing - This section is in relation to the house type source of water and sanitary conditions the household has currently.				
32.	Do you own this house?	Single	1	Yes
			2	No
33.	What are the external walls made of?	Single	1	Grass
			2	Mud (yomata).
			3	Compacted earth (yamdindo).
			4	Mud brick (unfired)
			5	Burnt bricks.
			6	Concrete
			7	Wood.
			8	Iron sheets
			9	Other
34.	What is the roof of the main dwelling predominately made of?	Single	1	Grass
			2	Iron sheets
			3	Clay tiles
			4	Concrete
			5	Plastic sheeting
			6	Other

Annexe 7: Household Survey

Question		Type	Answer option	
35.	What is your main source of lighting fuel?	Single	1	Collected firewood
			2	Purchased firewood
			3	Grass
			4	Paraffin
			5	Electricity
			6	Gas
			7	Battery/dry cell (torch)
			8	Candles
			9	Other
36.	What is your main source of cooking fuel?	Single	1	Collected firewood
			2	Purchased firewood
			3	Grass
			4	Electricity
			5	Gas
			6	Charcoal produced by household
			7	Purchased charcoal
			8	Paraffin
			9	Crop residue
			10	Saw dust
			11	Animal waste
			12	Other
37.	Is there electricity in the house (e.g. by national grid generator solar power)?	Single	1	Yes (specify)
			2	No

Annexe 7: Household Survey

Question		Type	Answer option	
38.	What was your main source of drinking water over the PAST MONTH?	Single	1	Piped into dwelling
			2	Piped outside dwelling personal
			3	Communal standpipe
			4	Personal handpump
			5	Communal handpump
			6	Protected spring
			7	Personal open unprotected well
			8	Communal open unprotected well.
			9	River/spring
			10	Lake/reservoir
			11	Other.
39.	How far is it to your main drinking source (KM)?	Numeric		
40.	Do you use this source for your drinking water...	Single	1	All year
			2	Only dry season
			3	Only rainy season
41.	In the other season what is your main source of drinking water?	Single	1	Piped into dwelling
			2	Piped outside dwelling personal
			3	Communal standpipe
			4	Personal hand pump
			5	Communal hand pump
			6	Protected spring
			7	Personal open unprotected well
			8	Communal open unprotected well.

Annexe 7: Household Survey

Question		Type	Answer option	
			9	River/spring
			10	Lake/reservoir
			11	Other.
42.	What kind of toilet facility does your household use?	Single	1	Flush toilet
			2	VIP latrine
			3	Traditional latrine with roof
			4	Traditional latrine without roof
			5	None.
			6	Other
43.	Is it only members of your household that have access to the toilet facility?	Single	1	Yes
			2	No
44.	Do any members of the household sleep under a bed net to protect against mosquitoes?	Single	1	Yes
			2	No
45.	Has/have the bed net(s) ever been treated with insecticides against mosquitoes in the PAST 6 MONTHS?	Single	1	Yes
			2	No
46.	Do the children under five sleep under a bed net at those times of the year when mosquitoes are present?	Single	1	Yes, for all children under five
			2	Yes, for some children under five
			3	No none of the children under five
			4	No children under 5
Durable Goods - This section asks about what durable goods the household owns and basic questions about each item.				
47.	Does your household own a Mortar/Pestle (motondo)?	Single	1	Yes
			2	No
48.	How many does you household own?	Numeric		

Annexe 7: Household Survey

Question		Type	Answer option	
49.	If you were to sell the item today how much would you receive (MWK)?	Numeric		
50.	Does your household own a Hoe?	Single	1	Yes
			2	No
51.	How many does you household own?	Numeric		
52.	If you were to sell the item today how much would you receive (MWK)?	Numeric		
53.	Does your household own a Panga?	Single	1	Yes
			2	No
54.	How many does you household own?	Numeric		
55.	If you were to sell the item today how much would you receive (MWK)?	Numeric		
56.	Does your household own an Axe?	Single	1	Yes
			2	No
57.	How many does you household own?	Numeric		
58.	If you were to sell the item today how much would you receive (MWK)?	Numeric		
59.	Does your household own a Sickle?	Single	1	Yes
			2	No
60.	How many does you household own?	Numeric		
61.	If you were to sell the item today how much would you receive (MWK)?	Numeric		
62.	Does your household own a Wheelbarrow?	Single	1	Yes
			2	No
63.	How many does you household own?	Numeric		
64.	If you were to sell the item today how much would you receive (MWK)?	Numeric		
65.	Does your household own an Ox Cart?	Single	1	Yes
			2	No

Annexe 7: Household Survey

Question		Type	Answer option	
66.	How many does you household own?	Numeric		
67.	If you were to sell the item today how much would you receive (MWK)?	Numeric		
68.	Does your household own a Bicycle?	Single	1	Yes
			2	No
69.	How many does you household own?	Numeric		
70.	If you were to sell the item today how much would you receive (MWK)?	Numeric		
71.	Does your household own a Lantern (paraffin)?	Single	1	Yes
			2	No
72.	How many does you household own?	Numeric		
73.	If you were to sell the item today how much would you receive (MWK)?	Numeric		
74.	Does your household own a Dry Cell/Battery Torch (e.g. Chinese Torch)?	Single	1	Yes
			2	No
75.	How many does you household own?	Numeric		
76.	If you were to sell the item today how much would you receive (MWK)?	Numeric		
77.	Does your household own a Bed?	Single	1	Yes
			2	No
78.	How many does you household own?	Numeric		
79.	If you were to sell the item today how much would you receive (MWK)?	Numeric		
80.	Does your household own a Table?	Single	1	Yes
			2	No
81.	How many does you household own?	Numeric		
82.	If you were to sell the item today how much would you receive (MWK)?	Numeric		
83.	Does your household own a Chair?	Single	1	Yes

Annexe 7: Household Survey

Question		Type	Answer option	
			2	No
84.	How many does you household own?	Numeric		
85.	If you were to sell the item today how much would you receive (MWK)?	Numeric		
86.	Does your household own Cupboards/Drawers?	Single	1	Yes
			2	No
87.	How many does you household own?	Numeric		
88.	If you were to sell the item today how much would you receive (MWK)?	Numeric		
89.	Does your household own a Beer Drum?	Single	1	Yes
			2	No
90.	How many does you household own?	Numeric		
91.	If you were to sell the item today how much would you receive (MWK)?	Numeric		
92.	Does your household own a Radio?	Single	1	Yes
			2	No
93.	How many does you household own?	Numeric		
94.	If you were to sell the item today how much would you receive (MWK)?	Numeric		
95.	Does your household own a Tape/CD Player?	Single	1	Yes
			2	No
96.	How many does you household own?	Numeric		
97.	If you were to sell the item today how much would you receive (MWK)?	Numeric		
98.	Does your household own a TV?	Single	1	Yes
			2	No
99.	How many does you household own?	Numeric		
100.	If you were to sell the item today how much would you receive (MWK)?	Numeric		

Annexe 7: Household Survey

Question		Type	Answer option	
101.	Does any household member own a Mobile Phone?	Single	1	Yes
			2	No
102.	How many does you household own?	Numeric		
103.	If you were to sell the item today how much would you receive (MWK)?	Numeric		
104.	Does your household own ANY OTHER durable goods not mentioned already (e.g. Motorcycle boat fishing nets Cooking Stove Sewing Machine Hand Sprayer)	Single	1	Yes (specify)
			2	No
105.	How many does you household own?	Numeric		
106.	If you were to sell the item today how much would you receive (MWK)?	Numeric		
Non-Food Expenditures - This section is in relation to ANY expenditures the household made over the last 12 months. FIRST discuss with respondent what were the household's MAIN expenditures throughout the year select discussed items from the list provided. SECONDLY ask if the household had any of the other items on the list that they had not mentioned already.				
107.	Over the PAST YEAR did the household purchase or pay for any of the items below? AND if so, how much did it cost (include value of in-kind payments - MWK)?	Multiple	1	School fees uniforms books etc.
			2	Linen towels sheets blankets
			3	Mat for sleeping or for drying maize flour
			4	Mosquito net
			5	Mattress
			7	Carpet rugs drapes curtains
			8	Building items - cement bricks timber iron sheets tools etc.
			9	Council rates
			10	Insurance – health/auto/home/life
			11	Losses to theft (value of items or cash lost)
			12	Fines or legal fees
			13	Lobola (bride wealth) costs
			14	Marriage ceremony costs

Annexe 7: Household Survey

Question		Type	Answer option	
			15	Funeral costs
			16	Other (specify item & price)
			17	None
Social Safety Nets - This section is in relation to any social safety nets or social programme the household may have benefited from in the last 12 MONTHS				
108.	Has anyone in your household in the 12 months received coupons from the government targeted inputs programme?	Single	1	Yes
			2	No
109.	Was your household an OFFICIAL BENEFICIARY of the input programme?	Single	1	Yes
			2	No
110.	Did the household receive FERTILIZER coupons?	Single	1	Yes
			2	No
111.	How many FERTILIZER coupons did the household receive?	Numeric		
112.	Did the household manage to purchase FERTILIZER with the FERTILIZER COUPON?	Single	1	Yes
			2	No
113.	What was the ESTIMATED MARKET VALUE of this fertilizer? (MWK)	Numeric		
114.	What was the TOTAL AMOUNT OF MONEY SPENT BY THE HOUSEHOLD sourcing fertilizer with the coupon?	Numeric		
115.	Did the household receive SEED coupons?	Single	1	Yes
			2	No
116.	How many SEED coupons did the household receive?	Numeric		
117.	Did the household manage to purchase SEED with the SEED COUPON?	Single	1	Yes
			2	No
118.	What was the ESTIMATED MARKET VALUE of this seed? (MWK)	Numeric		
119.	What was the TOTAL AMOUNT OF MONEY SPENT BY THE HOUSEHOLD sourcing seed with the coupon?	Numeric		

Annexe 7: Household Survey

Question		Type	Answer option	
120.	Has anyone in your household benefited in the last 12 months from inputs-for-work?	Single	1	Yes
			2	No
121.	What kind and quantity of inputs were received?	Open		
122.	What was the ESTIMATED MARKET VALUE of this benefit? (MWK)	Numeric		
123.	What months did the household benefit from this programme?	Multiple	1	Jan
			2	Feb
			3	Mar
			4	Apr
			5	May
			6	Jun
			7	Jul
			8	Aug
			9	Sep
			10	Oct
			11	Nov
			12	Dec
124.	Has anyone in your household benefited in the last 12 months from cash-for-work programme?	Single	1	Yes
			2	No
125.	How much cash was received (MWK)?	Numeric		
126.	What months did the household benefit from this programme?	Multiple	1	Jan
			2	Feb
			3	Mar
			4	Apr

Question		Type	Answer option	
			5	May
			6	Jun
			7	Jul
			8	Aug
			9	Sep
			10	Oct
			11	Nov
			12	Dec
127.	Has anyone in your household benefited in the last 12 months from food-for-work programme?	Single	1	Yes
			2	No
128.	What kind and quantity of food were received?	Open		
129.	What months did the household benefit from food-for-work?	Multiple	1	Jan
			2	Feb
			3	Mar
			4	Apr
			5	May
			6	Jun
			7	Jul
			8	Aug
			9	Sep
			10	Oct
			11	Nov
			12	Dec

Annexe 7: Household Survey

Question		Type	Answer option	
130.	What was the ESTIMATED MARKET VALUE of this benefit? (MWK)	Numeric		
131.	Has anyone in your household benefited in the last 12 months from a targeted nutrition programme (e.g. distribution of Likuni Phala to children and mothers)?	Single	1	Yes
			2	No
132.	What kind and quantity of food were received?	Open		
133.	What was the ESTIMATED MARKET VALUE of this benefit? (MWK)	Numeric		
134.	What months did the household benefit from this programme?	Multiple	1	Jan
			2	Feb
			3	Mar
			4	Apr
			5	May
			6	Jun
			7	Jul
			8	Aug
			9	Sep
			10	Oct
			11	Nov
			12	Dec
135.	Has anyone in your household benefited in the last 12 months from free food/maize distribution?	Single	1	Yes
			2	No
136.	What kind and quantity of food were received?	Open		
137.	What was the ESTIMATED MARKET VALUE of this benefit? (MWK)	Numeric		
138.	Has anyone in your household benefited in the last 12 months from a school feeding programme?	Single	1	Yes
			2	No

Annexe 7: Household Survey

Question		Type	Answer option	
139.	What kind and quantity of food were received?	Open		
140.	What was the ESTIMATED MARKET VALUE of this benefit? (MWK)	Numeric		
141.	Has anyone in your household benefited in the last 12 months from direct cash transfer programmes?	Single	1	Yes
			2	No
142.	What months did the household benefit from this programme?	Multiple	1	Jan
			2	Feb
			3	Mar
			4	Apr
			5	May
			6	Jun
			7	Jul
			8	Aug
			9	Sep
			10	Oct
			11	Nov
			12	Dec
143.	How much cash was received?	Numeric		
144.	Has anyone in your household benefited in the last 12 months from scholarships or bursaries for secondary education. (e.g. GABLE support for girls)	Single	1	Yes
			2	No
145.	What was the ESTIMATED VALUE of this benefit? (MWK)	Open		
146.	Has anyone in your household benefited in the last 12 months from Tertiary Loan Scheme (Government loan for university and other tertiary education programmes)	Single	1	Yes
			2	No
147.	What was the ESTIMATED VALUE of this benefit? (MWK)	Numeric		

Annexe 7: Household Survey

Question		Type	Answer option	
148.	Has anyone in your household benefited in the last 12 months from any OTHER programme?	Single	1	Yes (specify)
149.			2	No
150.	What was the ESTIMATED VALUE of this benefit? (MWK)	Numeric		
Non-Agri Enterprises Savings and Credit - This section asks about any non-agri businesses or enterprises the household may have AND any savings loans and credit over the last 12 months.				
151.	Has anyone in the household operated any NON-AGRICULTURAL INCOME-GENERATING ENTERPRISE in the last 12 MONTHS?	Single	1	Yes
			2	No
152.	What type of enterprise?	Single	1	Petty trading
			2	Making and selling mandazi
			3	Fish trading
			4	Brewing and distilling local beers
			5	Restaurant/tea room
			6	Selling agriculture inputs
			7	Grocery
			8	Bicycle taxi
			9	Electrical repair
			10	Selling firewood
			12	Making mats...
			13	Tailoring...
			14	Selling chips
			15	Selling mobile phone airtime
			16	Metal worker
			17	Tobacco trader
			18	Other (specify)

Annexe 7: Household Survey

Question		Type	Answer option	
153.	Enterprise number [x]: Which member of the household operates this enterprise on a day to day basis?	Multiple	1	Head
			2	Spouse
			3	Son/daughter
			4	Brother/sister
			5	Father/mother
			6	Son/daughter in law
			7	Orphan (below the age of 16)
			8	Orphan (above the age of 16)
			9	Grand child
			10	Other relative (specify)
154.	Enterprise number [x]: Who in the household makes the decisions in relation to the enterprise?	Single	1	Head
			2	Spouse
			3	Son/daughter
			4	Brother/sister
			5	Father/mother
			6	Son/daughter in law
			7	Orphan (below the age of 16)
			8	Orphan (above the age of 16)
			9	Grand child
			10	Other relative (specify)
155.	Enterprise number [x]: What was the TOTAL COST for the last 12 months MWK (include cost of stock labour transport taxes utility bills)?	Numeric		
156.	Enterprise number [x]: What was the TOTAL PROFIT MADE for the last 12 months MWK (i.e. Total money taken in MINUS Total Costs)?	Numeric		

Annexe 7: Household Survey

Question		Type	Answer option	
157.	Does the household OR any member of the household have any SAVINGS?	Single	1	Yes
			2	No
158.	Who in the household makes the decisions in relation to these savings?	Single	1	Head
			2	Spouse
			3	Son/daughter
			4	Brother/sister
			5	Father/mother
			6	Son/daughter in law
			7	Orphan (below the age of 16)
			8	Orphan (above the age of 16)
			9	Grand child
			10	Other relative (specify)
159.	How much do you have saved in MWK?	Numeric		
160.	Where is the money saved?	Single	1	Bank
			2	Home
			3	Savings club
			4	Micro finance institution
			5	Women's group
			6	Association
			7	Other (specify)
161.	Does the household OR any OTHER member of the household have any OTHER SAVINGS?	Single	1	Yes
			2	No
162.	Who in the household makes the decisions in relation to these savings?	Single	1	Head

Annexe 7: Household Survey

Question		Type	Answer option	
			2	Spouse
			3	Son/daughter
			4	Brother/sister
			5	Father/mother
			6	Son/daughter in law
			7	Orphan (below the age of 16)
			8	Orphan (above the age of 16)
			9	Grand child
			10	Other relative (specify)
163.	How much do you have saved in MWK?	Numeric		
164.	Where is the money saved?	Single	1	Bank
			2	Home
			3	Savings club
			4	Micro finance institution
			5	Women’s group
			6	Association
			7	Other (specify)
165.	Did the household or any member of the household receive credit or borrow in the past 12 months?	Single	1	Yes
			2	No
166.	Where was this this credit received?	Multiple	1	Relative
			2	Neighbour
			3	Grocery/local merchant
			4	Money lender (katapila).

Question		Type	Answer option	
			5	Employer
			6	Religious institution
			7	Mrfc
			8	Sacco
			9	Bank (commercial)
			10	Ngo.
			11	Other (specify)
167.	What was the reason for obtaining this loan?	Multiple	1	Purchase land
			2	Purchase agricultural inputs for food crops
			3	Purchase inputs for tobacco
			4	Purchase inputs for other cash crops
			5	Business start-up capital
			6	Purchase non-farm inputs
			7	To meet food needs
			8	Other (specify)
168.	How much was borrowed (MWK)?	Numeric		
169.	What is the total interest to be payed (MWK)?	Numeric		
170.	Did the household or any member of the household receive any OTHER credit in the past 12 months?	Single	1	Yes
			2	No
171.	Where was this this credit received?	Multiple	1	Relative
			2	Neighbour
			3	Grocery/local merchant
			4	Money lender (katapila).

Annexe 7: Household Survey

Question		Type	Answer option	
			5	Employer
			6	Religious institution
			7	MRFC
			8	Sacco
			9	Bank (commercial)
			10	NGO
			11	Other (specify)
172.	What was the reason for obtaining this loan?	Multiple	1	Purchase land
			2	Purchase agricultural inputs for food crops
			3	Purchase inputs for tobacco
			4	Purchase inputs for other cash crops
			5	Business start-up capital
			6	Purchase non-farm inputs
			7	To meet food needs
			8	Other (specify)
173.	How much was borrowed (MWK)?	Numeric		
174.	What is the total interest to be payed (MWK)?	Numeric		
Shocks - The following section is in relation to shocks that the household has been affected by in the last 12 months (rank in order of MOST SIGNIFICANT 2nd MOST SIGNIFICANT AND 3rd MOST SIGNIFICANT)				
175.	What was the MOST SIGNIFICANT shock you experienced?	Single	1	Lower crop yields due to drought or floods
			2	Crop disease or crop pests
			3	Livestock died or were stolen
			4	Household business failure non-agricultural

Question		Type	Answer option	
			5	Loss of salaried employment or non-payment of salary
			6	End of regular assistance aid or remittances from outside HH
			7	Large fall in sale prices for crops
			8	Large rise in price of food
			9	Illness or accident of household member
			10	Birth in the household
			11	Death of HH head
			12	Death of working member of household
			13	Death of other family member
			14	Break-up of the household
			15	Theft
			16	Dwelling damaged destroyed
			17	Other (briefly specify)
			18	None
176.	When was the MOST SIGNIFICANT shock you experienced?	Single	1	January
			2	February
			3	March
			4	April
			5	May
			6	June
			7	July
			8	August
			9	September

Annexe 7: Household Survey

Question		Type	Answer option	
			10	October
			11	November
			12	December
			13	None
177.	What was the MOST IMPORTANT thing you did in response to this shock to try to regain your former welfare level?	Multiple	1	Spent cash savings
			2	Sent children to live with relatives
			3	Sold assets (tools furniture etc.)
			4	Sold farmland
			5	Rented out farmland
			6	Sold animals
			7	Sold more crops
			8	Worked longer hours worked more
			9	Other HH members who weren't working went to work
			10	Started a new business
			11	Removed children from school to work
			12	Went elsewhere to find work for more than a month
			13	Borrowed money from relatives
			14	Borrowed money from money lender (katapila)
			15	Borrowed money from institution (bank, MRFC, etc.)
			16	Received help from religious institution
			17	Received help from local NGO
			18	Received help from international NGO
			19	Received help from government

Annexe 7: Household Survey

Question		Type	Answer option	
			20	Reduced food consumption
			21	Consumed lower cost but less preferred food
			22	Reduced non-food expenditures
			23	Spiritual effort - prayer sacrifices consulted diviner
			24	Did not do anything
			25	Other (briefly specify)
178.	What was the 2nd MOST SIGNIFICANT shock you experienced?	Single	1	Lower crop yields due to drought or floods
			2	Crop disease or crop pests
			3	Livestock died or were stolen
			4	Household business failure non-agricultural
			5	Loss of salaried employment or non-payment of salary
			6	End of regular assistance aid or remittances from outside HH
			7	Large fall in sale prices for crops
			8	Large rise in price of food
			9	Illness or accident of household member
			10	Birth in the household
			11	Death of HH head
			12	Death of working member of household
			13	Death of other family member
			14	Break-up of the household
			15	Theft
			16	Dwelling damaged destroyed
			17	Other (briefly specify)

Question		Type	Answer option	
			18	None
179.	When was the 2nd MOST SIGNIFICANT shock you experienced?	Single	1	January
			2	February
			3	March
			4	April
			5	May
			6	June
			7	July
			8	August
			9	September
			10	October
			11	November
			12	December
			13	None
180.	What was the 2nd MOST IMPORTANT thing you did in response to this shock to try to regain your former welfare level?	Multiple	1	Spent cash savings
			2	Sent children to live with relatives
			3	Sold assets (tools furniture etc.)
			4	Sold farmland
			5	Rented out farmland
			6	Sold animals
			7	Sold more crops
			8	Worked longer hours worked more
			9	Other HH members who weren't working went to work

Question		Type	Answer option	
			10	Started a new business
			11	Removed children from school to work
			12	Went elsewhere to find work for more than a month
			13	Borrowed money from relatives
			14	Borrowed money from money lender (katapila)
			15	Borrowed money from institution (bank, MRFC, etc.)
			16	Received help from religious institution
			17	Received help from local NGO
			18	Received help from international NGO
			19	Received help from government
			20	Reduced food consumption
			21	Consumed lower cost but less preferred food
			22	Reduced non-food expenditures
			23	Spiritual effort - prayer sacrifices consulted diviner
			24	Did not do anything
			25	Other (briefly specify)
181.	What was the 3rd MOST SIGNIFICANT shock you experienced?	Single	1	Lower crop yields due to drought or floods
			2	Crop disease or crop pests
			3	Livestock died or were stolen
			4	Household business failure non-agricultural
			5	Loss of salaried employment or non-payment of salary
			6	End of regular assistance aid or remittances from outside HH
			7	Large fall in sale prices for crops

Question		Type	Answer option	
			8	Large rise in price of food
			9	Illness or accident of household member
			10	Birth in the household
			11	Death of HH head
			12	Death of working member of household
			13	Death of other family member
			14	Break-up of the household
			15	Theft
			16	Dwelling damaged destroyed
			17	Other (briefly specify)
			18	None
182.	When was the 3rd MOST SIGNIFICANT shock you experienced?	Single	1	January
			2	February
			3	March
			4	April
			5	May
			6	June
			7	July
			8	August
			9	September
			10	October
			11	November
			12	December

Annexe 7: Household Survey

Question		Type	Answer option	
			13	None
183.	What was the 3rd MOST IMPORTANT thing you did in response to this shock to try to regain your former welfare level?	Multiple	1	Spent cash savings
			2	Sent children to live with relatives
			3	Sold assets (tools furniture etc.)
			4	Sold farmland
			5	Rented out farmland
			6	Sold animals
			7	Sold more crops
			8	Worked longer hours worked more
			9	Other HH members who weren't working went to work
			10	Started a new business
			11	Removed children from school to work
			12	Went elsewhere to find work for more than a month
			13	Borrowed money from relatives
			14	Borrowed money from money lender (katapila)
			15	Borrowed money from institution (bank, MRFC, etc.)
			16	Received help from religious institution
			17	Received help from local NGO
			18	Received help from international NGO
			19	Received help from government
			20	Reduced food consumption
			21	Consumed lower cost but less preferred food
			22	Reduced non-food expenditures

Annexe 7: Household Survey

Question		Type	Answer option	
			23	Spiritual effort - prayer sacrifices consulted diviner
			24	Did not do anything
			25	Other (briefly specify)
Participation in Coordinated Agri-Services - This section asks questions about membership of agri-associations and groups participation and visits from agri-support services.				
184.	Are any household members involved with farming organisations or associations?	Single	1	Yes
			2	No
185.	Which household members are involved?	Multiple	1	Head
			2	Spouse
			3	Son/daughter
			4	Brother/sister
			5	Father/mother
			6	Son/daughter in law
			7	Orphan (below the age of 16)
			8	Orphan (above the age of 16)
			9	Grand child
			10	Other relative (specify)
186.	What organisations or associations?	Multiple	1	Local ExAgris association
			2	NASFAM
			3	Co-op group
			4	Other (specify)
187.	Did the household or any member of the household receive a visit from a GOVERNMENT AGRICULTURE EXTENSION ADVISER in the last 12 months?	Single	1	Yes
			2	No
188.	How many visits in the last 12 months?	Numeric		

Annexe 7: Household Survey

Question		Type	Answer option	
189.	What type of advice was given?	Multiple	1	Production
			2	Pest and disease
			3	Market advice
			4	Husbandry
			5	Livestock disease
			6	Other (specify)
190.	How would you rate the visit(s)?	Single	1	Excellent
			2	Good
			3	Fair
			4	Poor
			5	Very poor
			0	Refused/don't know
191.	Has any household member attended GOVERNMENT agricultural trainings or demonstrations in the last 12 months?	Single	1	Yes
			2	No
192.	What type of training/demo was it?	Multiple	1	Production
			2	Pest and disease
			3	Market advice
			4	Husbandry
			5	Livestock disease
			6	Other (specify)
193.	How many training/demos were attended?	Numeric		
194.	How would you rate the trainings/demos?	Single	1	Excellent
			2	Good

Annexe 7: Household Survey

Question		Type	Answer option	
			3	Fair
			4	Poor
			5	Very poor
			0	Refused/don't know
195.	Did the household or any member of the household receive a visit from an ExAgris AGRICULTURE EXTENSION ADVISER in the last 12 months?	Single	1	Yes
			2	No
196.	How many visits in the last 12 months?	Numeric		
197.	What type of advice was given?	Multiple	1	Production
			2	Pest and disease
			3	Market advice
			4	Husbandry
			5	Livestock disease
			6	Other (specify)
198.	How would you rate the visit(s)?	Single	1	Excellent
			2	Good
			3	Fair
			4	Poor
			5	Very poor
			0	Refused/don't know
199.	Has any household member attended ExAgris agricultural trainings or demonstrations in the last 12 months?	Single	1	Yes
			2	No
200.	What type of training/demo was it?	Multiple	1	Production
			2	Pest and disease

Annexe 7: Household Survey

Question		Type	Answer option	
			3	Market advice
			4	Husbandry
			5	Livestock disease
			6	Other (specify)
201.	How many training/demos were attended?	Numeric		
202.	How would you rate the trainings/demos?	Single	1	Excellent
			2	Good
			3	Fair
			4	Poor
			5	Very poor
			0	Refused/don't know
203.	Did the household or any member of the household receive a visit from any OTHER AGRICULTURE EXTENSION ADVISER in the last 12 months?	Single	1	Yes (specify)
			2	No
204.	How many visits in the last 12 months?	Numeric		
205.	What type of advice was given?	Multiple	1	Production
			2	Pest and disease
			3	Market advice
			4	Husbandry
			5	Livestock disease
			6	Other (specify)
206.	How would you rate the visit(s)?	Single	1	Excellent
			2	Good
			3	Fair

Annexe 7: Household Survey

Question		Type	Answer option	
			4	Poor
			5	Very poor
			0	Refused/don't know
207.	Has any household member attended ANY OTHER agricultural trainings or demonstrations in the last 12 months?	Single	1	Yes
			2	No
208.	What type of training/demo was it?	Multiple	1	Production
			2	Pest and disease
			3	Market advice
			4	Husbandry
			5	Livestock disease
			6	Other (specify)
209.	How many training/demos were attended?	Numeric		
210.	How would you rate the trainings/demos?	Single	1	Excellent
			2	Good
			3	Fair
			4	Poor
			5	Very poor
			0	Refused/don't know
Consumption INCLUDE FOOD BOTH EATEN COMMUNALLY IN THE HOUSEHOLD AND THAT EATEN SEPARATELY BY INDIVIDUAL HOUSEHOLD MEMBERS.				
211.	Has the household consumed any Cereals Grains and Cereal Products in last 7 days?	Single	1	Yes
			2	No
212.	Over the past 7 days did you or others in your household consume MAIZE FLOUR?	Single	1	Yes
			2	No

Annexe 7: Household Survey

Question		Type	Answer option	
213.	How much did your household consume in total? (KG)	Numeric		
214.	How much came from purchases? (KG)	Numeric		
215.	How much did you spend?	Numeric		
216.	How much came from your own production? (KG)	Numeric		
217.	Over the past 7 days did you or others in your household consume MAIZE GRAIN?	Single	1	Yes
			2	No
218.	How much did your household consume in total? (KG)	Numeric		
219.	How much came from purchases? (KG)	Numeric		
220.	How much did you spend?	Numeric		
221.	How much came from your own production (KG)?	Numeric		
222.	Over the past 7 days did you or others in your household consume any RICE?	Single	1	Yes
			2	No
223.	How much did your household consume in total? (KG)	Numeric		
224.	How much came from purchases? (KG)	Numeric		
225.	How much did you spend?	Numeric		
226.	How much came from your own production? (KG)	Numeric		
227.	Over the 7 days did you or others in your household consume BUNS/SCONES?	Single	1	Yes
			2	No
228.	How much did your household consume in total? (KG)	Numeric		
229.	How much came from purchases? (KG)	Numeric		
230.	How much did you spend?	Numeric		
231.	How much came from your own production? (KG)	Numeric		
232.	Over the past 7 days did you or others in your household consume BREAD?	Single	1	Yes

Annexe 7: Household Survey

Question		Type	Answer option	
			2	No
233.	How much did your household consume in total? (KG)	Numeric		
234.	How much came from purchases? (KG)	Numeric		
235.	How much did you spend?	Numeric		
236.	How much came from your own production? (KG)	Numeric		
237.	Has the household consumed any Roots Tubers or Plantain Products in last 7 days?	Single	1	Yes
			2	No
238.	Over the past 7 days did you or others in your household consume any POTATO?	Single	1	Yes
			2	No
239.	How much did your household consume in total? (KG)	Numeric		
240.	How much came from purchases? (KG)	Numeric		
241.	How much did you spend? (MWK)	Numeric		
242.	How much came from your own production? (KG)	Numeric		
243.	Over the past 7 days did you or others in your household consume CASSAVA TUBERS?	Single	1	Yes
			2	No
244.	How much did your household consume in total? (KG)	Numeric		
245.	How much came from purchases? (KG)	Numeric		
246.	How much did you spend? (MWK)	Numeric		
247.	How much came from your own production? (KG)	Numeric		
248.	You will now be asked some Questions the Consumption of Pulses in your Family. Have you consumed any Pulses in last week?	Single	1	Yes
			2	No
249.	Over the past 7 days did you or others in your household consume any BEANS?	Single	1	Yes
			2	No

Annexe 7: Household Survey

Question		Type	Answer option	
250.	How much did your household consume in total? (KG)	Numeric		
251.	How much came from purchases? (KG)	Numeric		
252.	How much did you spend? (MWK)	Numeric		
253.	How much came from your own production? (KG)	Numeric		
254.	Over the past 7 days did you or others in your household consume any GROUNDNUT?	Single	1	Yes
			2	No
255.	How much did your household consume in total? (UN-SHELLED KG)	Numeric		
256.	How much came from purchases? (UN-SHELLED KG)	Numeric		
257.	How much did you spend? (MWK)	Numeric		
258.	How much came from your own production? (UN-SHELLED KG)	Numeric		
259.	Over the past 7 days did you or others in your household consume any PEAS?	Single	1	Yes
			2	No
260.	How much did your household consume in total? (KG)	Numeric		
261.	How much came from purchases? (KG)	Numeric		
262.	How much did you spend? (MWK)	Numeric		
263.	How much came from your own production? (KG)	Numeric		
264.	You will now be asked some Questions on the Consumption of Vegetables in your Family. Have you consumed any Vegetables in last week?	Single	1	Yes
			2	No
265.	Over the past 7 days did you or others in your household consume any TOMATO?	Single	1	Yes
			2	No
266.	How much did your household consume in total? (KG)	Numeric		
267.	How much came from purchases? (KG)	Numeric		
268.	How much did you spend? (MWK)	Numeric		

Annexe 7: Household Survey

Question		Type	Answer option	
269.	How much came from your own production? (KG)	Numeric		
270.	Over the past 7 days did you or others in your household consume any ONION?	Single	1	Yes
			2	No
271.	How much did your household consume in total? (KG)	Numeric		
272.	How much came from purchases? (KG)	Numeric		
273.	How much did you spend? (MWK)	Numeric		
274.	How much came from your own production? (KG)	Numeric		
275.	Over the past 7 days did you or others in your household consume any RAPE?	Single	1	Yes
			2	No
276.	How much did your household consume in total? (KG)	Numeric		
277.	How much came from purchases? (KG)	Numeric		
278.	How much did you spend? (MWK)	Numeric		
279.	How much came from your own production? (KG)	Numeric		
280.	Over the past 7 days did you or others in your household consume any PUMPKIN LEAVES?	Single	1	Yes
			2	No
281.	How much did your household consume in total? (KG)	Numeric		
282.	How much came from purchases? (KG)	Numeric		
283.	How much did you spend? (MWK)	Numeric		
284.	How much came from your own production? (KG)	Numeric		
285.	Over the past 7 days did you or others in your household consume any OTHER GREEN VEGETABLES?	Single	1	Yes (specify)
286.			2	No
287.	How much did your household consume in total? (KG)	Numeric		
288.	How much came from purchases? (KG)	Numeric		

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Question		Type	Answer option	
289.	How much did you spend? (MWK)	Numeric		
290.	How much came from your own production? (KG)	Numeric		
291.	Has the household consumed any Meat Fish and Animal Products in last 7 days? INCLUDE FOOD BOTH EATEN COMMUNALLY IN THE HOUSEHOLD AND THAT EATEN SEPARATELY BY INDIVIDUAL HOUSEHOLD MEMBERS	Single	1	Yes
			2	No
292.	Over the past 7 days did you or others in your household consume EGG?	Single	1	Yes
			2	No
293.	How much did your household consume in total? (KG)	Numeric		
294.	How much came from purchases? (KG)	Numeric		
295.	How much did you spend? (MWK)	Numeric		
296.	How much came from your own production? (KG)	Numeric		
297.	Over the past 7 days did you or others in your household consume DRIED FISH?	Single	1	Yes
			2	No
298.	How much did your household consume in total? (KG)	Numeric		
299.	How much came from purchases? (KG)	Numeric		
300.	How much did you spend? (MWK)	Numeric		
301.	How much came from your own production? (KG)	Numeric		
302.	Over the past 7 days did you or others in your household consume GOAT?	Single	1	Yes
			2	No
303.	How much did your household consume in total? (KG)	Numeric		
304.	How much came from purchases? (KG)	Numeric		
305.	How much did you spend? (MWK)	Numeric		
306.	How much came from your own production? (KG)	Numeric		
307.	Over the past 7 days did you or others in your household consume CHICKEN?	Single	1	Yes

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Question		Type	Answer option	
			2	No
308.	How much did your household consume in total? (KG)	Numeric		
309.	How much came from purchases? (KG)	Numeric		
310.	How much did you spend? (MWK)	Numeric		
311.	How much came from your own production? (KG)	Numeric		
312.	Over the past 7 days did you or others in your household consume PORK?	Single	1	Yes
			2	No
313.	How much did your household consume in total? (KG)	Numeric		
314.	How much came from purchases? (KG)	Numeric		
315.	How much did you spend? (MWK)	Numeric		
316.	How much came from your own production? (KG)	Numeric		
317.	Over the past 7 days did you or others in your household consume SMALL ANIMAL?	Single	1	Yes
			2	No
318.	How much did your household consume in total? (KG)	Numeric		
319.	How much came from purchases? (KG)	Numeric		
320.	How much did you spend? (MWK)	Numeric		
321.	How much came from your own production? (KG)	Numeric		
322.	Has the household consumed any FRUIT or FRUIT PRODUCTS in last 7 days? INCLUDE FOOD BOTH EATEN COMMUNALLY IN THE HOUSEHOLD AND THAT EATEN SEPARATELY BY INDIVIDUAL HOUSEHOLD MEMBERS.	Single	1	Yes
			2	No
323.	Over the past 7 days did you or others in your household consume BANANA?	Single	1	Yes
			2	No
324.	How much did your household consume in total? (KG)	Numeric		
325.	How much came from purchases? (KG)	Numeric		

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Question		Type	Answer option	
326.	How much did you spend? (MWK)	Numeric		
327.	How much came from your own production? (KG)	Numeric		
328.	Over the past 7 days did you or others in your household consume any CITRUS FRUITS?	Single	1	Yes
			2	No
329.	How much did your household consume in total? (KG)	Numeric		
330.	How much came from purchases? (KG)	Numeric		
331.	How much did you spend? (MWK)	Numeric		
332.	How much came from your own production? (KG)	Numeric		
333.	Over the past 7 days did you or others in your household consume GUAVA?	Single	1	Yes
			2	No
334.	How much did your household consume in total? (KG)	Numeric		
335.	How much came from purchases? (KG)	Numeric		
336.	How much did you spend? (MWK)	Numeric		
337.	How much came from your own production? (KG)	Numeric		
338.	Over the past 7 days did you or others in your household consume MANGO?	Single	1	Yes
			2	No
339.	How much did your household consume in total? (KG)	Numeric		
340.	How much came from purchases? (KG)	Numeric		
341.	How much did you spend? (MWK)	Numeric		
342.	How much came from your own production? (KG)	Numeric		
343.	Over the past 7 days did you or others in your household consume WILD FRUIT?	Single	1	Yes
			2	No
344.	How much did your household consume in total? (KG)	Numeric		

Annexe 7: Household Survey

Question		Type	Answer option	
345.	How much came from purchases? (KG)	Numeric		
346.	How much did you spend? (MWK)	Numeric		
347.	How much came from your own production? (KG)	Numeric		
348.	You will now be asked what were the TOP 4 Cooked Foods from Vendors consumed by the household/household members in last 7 days? INCLUDE FOOD BOTH EATEN COMMUNALLY IN THE HOUSEHOLD AND THAT EATEN SEPARATELY BY INDIVIDUAL HOUSEHOLD MEMBERS.	Info		
349.	Over the past 7 days did you or others in your household consume any of the following from vendors?	Single	12	None (go to next section)
			1	Maize - boiled or roasted
			2	Chips
			3	Cassava - boiled
			4	Eggs - boiled
			5	Chicken
			6	Meat
			7	Fish
			8	Mandazi doughnut
			9	Samosa
			10	Meal eaten at restaurant
			11	Other (specify)
350.	How much did your household consume in total? (KG)	Numeric		
351.	How much did you spend? (MWK)	Numeric		
352.	Over the past 7 days did you or others in your household consume any of the following from vendors?	Single	12	None (go to next section)
			1	Maize - boiled or roasted
			2	Chips
			3	Cassava - boiled

Question		Type	Answer option	
			4	Eggs - boiled
			5	Chicken
			6	Meat
			7	Fish
			8	Mandazi doughnut
			9	Samosa
			10	Meal eaten at restaurant
			11	Other (specify)
353.	How much did your household consume in total? (KG)	Numeric		
354.	How much did you spend? (MWK)	Numeric		
355.	Over the past 7 days did you or others in your household consume any of the following from vendors?	Single	12	None (go to next section)
			1	Maize - boiled or roasted
			2	Chips
			3	Cassava - boiled
			4	Eggs - boiled
			5	Chicken
			6	Meat
			7	Fish
			8	Mandazi doughnut
			9	Samosa
			10	Meal eaten at restaurant
			11	Other (specify)
356.	How much did your household consume in total? (KG)	Numeric		

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Question		Type	Answer option	
357.	How much did you spend? (MWK)	Numeric		
358.	Over the past 7 days did you or others in your household consume any of the following from vendors?	Single	12	None (go to next section)
			1	Maize - boiled or roasted
			2	Chips
			3	Cassava - boiled
			4	Eggs - boiled
			5	Chicken
			6	Meat
			7	Fish
			8	Mandazi doughnut
			9	Samosa
			10	Meal eaten at restaurant
			11	Other (specify)
359.	How much did your household consume in total? (KG)	Numeric		
360.	How much did you spend? (MWK)	Numeric		
361.	You will now be asked what were the TOP 4 MILK and MILK PRODUCTS consumed by the household/household members in last 7 days? INCLUDE FOOD BOTH EATEN COMMUNALLY IN THE HOUSEHOLD AND THAT EATEN SEPARATELY BY INDIVIDUAL HOUSEHOLD MEMBERS.	Info		
362.	Over the past 7 days did you or others in your household consume any of the following:	Single	9	None (go to next section)
			1	Fresh milk
			2	Powdered milk
			3	Margarine
			4	Chombiko/soured milk
			5	Yoghurt

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Question		Type	Answer option	
			6	Cheese
			7	Infant feeding formula
			8	Other (specify)
363.	How much did your household consume in total? (KG)	Numeric		
364.	How much came from purchases? (KG)	Numeric		
365.	How much did you spend? (MWK)	Numeric		
366.	How much came from your own production? (KG)	Numeric		
367.	Over the past 7 days did you or others in your household consume any of the following:	Single	9	None (go to next section)
			1	Fresh milk
			2	Powdered milk
			3	Margarine
			4	Chombiko/soured milk
			5	Yoghurt
			6	Cheese
			7	Infant feeding formula
			8	Other (specify)
368.	How much did your household consume in total? (KG)	Numeric		
369.	How much came from purchases? (KG)	Numeric		
370.	How much did you spend? (MWK)	Numeric		
371.	How much came from your own production? (KG)	Numeric		
372.	Over the past 7 days did you or others in your household consume any of the following:	Single	9	None (go to next section)
			1	Fresh milk
			2	Powdered milk

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Question		Type	Answer option	
			3	Margarine
			4	Chombiko/soured milk
			5	Yoghurt
			6	Cheese
			7	Infant feeding formula
			8	Other (specify)
373.	How much did your household consume in total? (KG)	Numeric		
374.	How much came from purchases? (KG)	Numeric		
375.	How much did you spend? (MWK)	Numeric		
376.	How much came from your own production? (KG)	Numeric		
377.	Over the past 7 days did you or others in your household consume any of the following:	Single	9	None (go to next section)
			1	Fresh milk
			2	Powdered milk
			3	Margarine
			4	Chombiko/soured milk
			5	Yoghurt
			6	Cheese
			7	Infant feeding formula
			8	Other (specify)
378.	How much did your household consume in total? (KG)	Numeric		
379.	How much came from purchases? (KG)	Numeric		
380.	How much did you spend? (MWK)	Numeric		
381.	How much came from your own production? (KG)	Numeric		

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	Question	Type	Answer option	
382.	You will now be asked what were the TOP 4 SUGAR FAT and OIL PRODUCTS consumed by the household/household members in last 7 days? INCLUDE FOOD BOTH EATEN COMMUNALLY IN THE HOUSEHOLD AND THAT EATEN SEPARATELY BY INDIVIDUAL HOUSEHOLD MEMBERS.	Info		
383.	Over the past 7 days did you or others in your household consume any of the following SUGARS FATS and OILS:	Single	5	None (go to next section)
			1	Sugar
			2	Sugar cane
			3	Cooking oil
			4	Other (specify)
384.	How much did your household consume in total? (KG)	Numeric		
385.	How much came from purchases? (KG)	Numeric		
386.	How much did you spend? (MWK)	Numeric		
387.	How much came from your own production? (KG)	Numeric		
388.	Over the past 7 days did you or others in your household consume any of the following SUGARS FATS and OILS:	Single	5	None (go to next section)
			1	Sugar
			2	Sugar cane
			3	Cooking oil
			4	Other (specify)
389.	How much did your household consume in total? (KG)	Numeric		
390.	How much came from purchases? (KG)	Numeric		
391.	How much did you spend? (MWK)	Numeric		
392.	How much came from your own production? (KG)	Numeric		
393.	Over the past 7 days did you or others in your household consume any of the following SUGARS FATS and OILS:	Single	5	None (go to next section)
			1	Sugar
			2	Sugar cane

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Question		Type	Answer option	
			3	Cooking oil
			4	Other (specify)
394.	How much did your household consume in total? (KG)	Numeric		
395.	How much came from purchases? (KG)	Numeric		
396.	How much did you spend? (MWK)	Numeric		
397.	How much came from your own production? (KG)	Numeric		
398.	Over the past 7 days did you or others in your household consume any of the following SUGARS FATS and OILS:	Single	5	None (go to next section)
			1	Sugar
			2	Sugar cane
			3	Cooking oil
			4	Other (specify)
399.	How much did your household consume in total? (KG)	Numeric		
400.	How much came from purchases? (KG)	Numeric		
401.	How much did you spend? (MWK)	Numeric		
402.	How much came from your own production? (KG)	Numeric		
403.	You will now be asked what were the TOP 4 BEVERAGES consumed by the household/household members in last 7 days? INCLUDE BEVERAGES DRANK COMMUNALLY IN THE HOUSEHOLD AND SEPARATELY BY INDIVIDUAL HOUSEHOLD MEMBERS.	Info		
404.	Over the past 7 days did you or others in your household consume any of the following BEVERAGES?	Single	13	None (go to next section)
			1	Tea/ coffee
			2	Squash (sobo drink concentrate)
			3	Fruit juice
			4	Freezes (flavoured ice)
			5	Soft drinks (coca-cola fanta sprite etc.)

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Question		Type	Answer option	
			6	Chibuku/napolo (commercial traditional-style beer)
			7	Bottled / canned beer (Carlsberg etc.)
			8	Local sweet beer (thobwa)
			9	Traditional beer (masase)
			10	Wine or commercial liquor
			11	Locally brewed liquor (kachasu)
			12	Other (specify)
405.	How much did your household consume in total? (LITERS/KG)	Numeric		
406.	How much came from purchases? (LITERS/KG)	Numeric		
407.	How much did you spend? (MWK)	Numeric		
408.	How much came from your own production? (LITERS/KG)	Numeric		
409.	Over the past 7 days did you or others in your household consume any of the following BEVERAGES?	Single	13	None (go to next section)
			1	Tea/ coffee
			2	Squash (sobo drink concentrate)
			3	Fruit juice
			4	Freezes (flavoured ice)
			5	Soft drinks (coca-cola fanta sprite etc.)
			6	Chibuku/napolo (commercial traditional-style beer)
			7	Bottled / canned beer (carlsberg etc.)
			8	Local sweet beer (thobwa)
			9	Traditional beer (masase)
			10	Wine or commercial liquor
			11	Locally brewed liquor (kachasu)

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Question		Type	Answer option	
			12	Other (specify)
410.	How much did your household consume in total? (LITERS/KG)	Numeric		
411.	How much came from purchases? (LITERS/KG)	Numeric		
412.	How much did you spend? (MWK)	Numeric		
413.	How much came from your own production? (LITERS/KG)	Numeric		
414.	Over the past 7 days did you or others in your household consume any of the following BEVERAGES?	Single	13	None (go to next section)
			1	Tea/ coffee
			2	Squash (sobo drink concentrate)
			3	Fruit juice
			4	Freezes (flavoured ice)
			5	Soft drinks (coca-cola fanta sprite etc.)
			6	Chibuku/napolo (commercial traditional-style beer)
			7	Bottled / canned beer (carlsberg etc.)
			8	Local sweet beer (thobwa)
			9	Traditional beer (masase)
			10	Wine or commercial liquor
			11	Locally brewed liquor (kachasu)
			12	Other (specify)
415.	How much did your household consume in total? (LITERS/KG)	Numeric		
416.	How much came from purchases? (LITERS/KG)	Numeric		
417.	How much did you spend? (MWK)	Numeric		
418.	How much came from your own production? (LITERS/KG)	Numeric		
419.	Over the past 7 days did you or others in your household consume any of the following BEVERAGES?	Single	13	None (go to next section)

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Question		Type	Answer option	
			1	Tea/ coffee
			2	Squash (sobo drink concentrate)
			3	Fruit juice
			4	Freezes (flavoured ice)
			5	Soft drinks (coca-cola fanta sprite etc.)
			6	Chibuku/napolo (commercial traditional-style beer)
			7	Bottled / canned beer (carlsberg etc.)
			8	Local sweet beer (thobwa)
			9	Traditional beer (masase)
			10	Wine or commercial liquor
			11	Locally brewed liquor (kachasu)
			12	Other (specify)
420.	How much did your household consume in total? (LITERS/KG)	Numeric		
421.	How much came from purchases? (LITERS/KG)	Numeric		
422.	How much did you spend? (MWK)	Numeric		
423.	How much came from your own production? (LITERS/KG)	Numeric		
424.	You will now be asked what were the TOP 4 Spices & Other Miscellaneous Products consumed by the household/household members in last 7 days? INCLUDE FOOD BOTH EATEN COMMUNALLY IN THE HOUSEHOLD AND THAT EATEN SEPARATELY BY INDIVIDUAL HOUSEHOLD MEMBERS.	Info		
425.	Over the past 7 days did you or others in your household consume any of the following	Single	9	None (go to next section)
			1	Salt
			2	Spices
			3	Yeast baking powder bicarbonate of soda
			4	Tomato sauce (bottle)

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Question		Type	Answer option	
			5	Hot sauce (Nali etc.)
			6	Jam jelly honey
			7	Sweets candy chocolates
			8	Other (specify)
426.	How much did your household consume in total? (KG)	Numeric		
427.	How much came from purchases? (KG)	Numeric		
428.	How much did you spend? (MWK)	Numeric		
429.	How much came from your own production? (KG)	Numeric		
430.	Over the past 7 days did you or others in your household consume any of the following	Single	9	None (go to next section)
			1	Salt
			2	Spices
			3	Yeast baking powder bicarbonate of soda
			4	Tomato sauce (bottle)
			5	Hot sauce (Nali etc.)
			6	Jam jelly honey
			7	Sweets candy chocolates
			8	Other (specify)
431.	How much did your household consume in total? (KG)	Numeric		
432.	How much came from purchases? (KG)	Numeric		
433.	How much did you spend? (MWK)	Numeric		
434.	How much came from your own production? (KG)	Numeric		
435.	Over the past 7 days did you or others in your household consume any of the following	Single	9	None (go to next section)
			1	Salt

Question		Type	Answer option	
			2	Spices
			3	Yeast baking powder bicarbonate of soda
			4	Tomato sauce (bottle)
			5	Hot sauce (Nali etc.)
			6	Jam jelly honey
			7	Sweets candy chocolates
			8	Other (specify)
436.	How much did your household consume in total? (KG)	Numeric		
437.	How much came from purchases? (KG)	Numeric		
438.	How much did you spend? (MWK)	Numeric		
439.	How much came from your own production? (KG)	Numeric		
440.	Over the past 7 days did you or others in your household consume any of the following	Single	9	None (go to next section)
			1	Salt
			2	Spices
			3	Yeast baking powder bicarbonate of soda
			4	Tomato sauce (bottle)
			5	Hot sauce (Nali etc.)
			6	Jam jelly honey
			7	Sweets candy chocolates
			8	Other (specify)
441.	How much did your household consume in total? (KG)	Numeric		
442.	How much came from purchases? (KG)	Numeric		
443.	How much did you spend? (MWK)	Numeric		

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Question		Type	Answer option	
444.	How much came from your own production? (KG)	Numeric		
MAIZE Annual Food Balance - This section is in relation to LAST YEARS MAIZE production consumption and sales.				
445.	What crops did you harvest LAST YEAR?	Multiple	1	Hybrid maize
			2	Local maize
			3	Composite maize
			4	Groundnut
			5	Sorghum
			6	Cassava
			7	Common bean
			8	Ground bean
			9	Soya bean
			10	Pigeon pea
			11	Cow pea
			12	Pumpkin & pumpkin leaves
			13	Orange flesh sweet potato
			14	White flesh sweet potato
			15	Irish potato
			16	Okra
			17	Sugar cane
			18	Burley tobacco
			19	Fire cured tobacco
			20	Cotton
			21	Rice

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Question		Type	Answer option	
			22	Tomato
			23	Onion
			24	Chile
			25	Paprika
			26	Millet
			27	Other (specify)
446.	CROP TYPE [x]: What seasons did you cultivate this crop LAST YEAR?	Multiple	1	Rain-fed
			2	Dimba/winter
			3	Both
447.	CROP TYPE [x]: Quantity harvested LAST YEAR (KG)?	Numeric		
448.	CROP TYPE [x]: Total quantity consumed from own production (KG)?	Numeric		
449.	CROP TYPE [x]: In what months did you consume your own production?	Multiple	1	January
			2	February
			3	March
			4	April
			5	May
			6	June
			7	July
			8	August
			9	September
			10	October
			11	November
			12	December

Question		Type	Answer option	
			13	Did not consume from production
450.	CROP TYPE [x]: Did you sell this crop last year (KG)?	Single	1	Yes
			2	No
451.	CROP TYPE [x]: Quantity sold from own production (KG)?	Numeric		
452.	CROP TYPE [x]: Amount earned from sale (MWK)?	Numeric		
453.	CROP TYPE [x]: What month did you start selling?	Single	1	January
			2	February
			3	March
			4	April
			5	May
			6	June
			7	July
			8	August
			9	September
			10	October
			11	November
			12	December
454.	CROP TYPE [x]: How satisfied were you to start selling at this time?	Single	4	Completely dissatisfied
			3	Somewhat dissatisfied
			2	Somewhat satisfied
			1	Completely satisfied
455.	CROP TYPE [x]: Who did you sell to (INCLUDE ALL BUYERS)?	Multiple	10	Other (specify)
			9	ExAgris

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Question		Type	Answer option	
			8	Auction floor
			7	Private company
			6	Cooperative/association
			5	ADMARC
			4	Local market
			3	Neighbour
			2	Relative
			1	Trader
456.	CROP TYPE [x]: Who was your FIRST buyer?	Single	1	Trader
			2	Relative
			3	Neighbour
			4	Local market
			5	ADMARC
			6	Cooperative/association
			7	Private company
			8	Auction floor
			9	ExAgris
			10	Other (specify)
457.	CROP TYPE [x]: Why did you choose to sell to this buyer?	Single	1	Always sell to this trader
			2	Closest buyer
			3	Best price
			4	Contracted to sell to buyer
			5	Other (specify)

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Question		Type	Answer option	
458.	CROP TYPE [x]: What proportion of your sales of this crop were to the FIRST buyer?	Single	1	Less than 25%
			2	25% - 50%
			3	50% - 75%
			4	More than 75%
459.	CROP TYPE [x]: How far did you have to travel to sell your crop (KM)?	Numeric		
460.	CROP TYPE [x]: Did you store any seeds from your own production?	Single	1	Yes
			2	No
461.	CROP TYPE [x]: Quantity of seeds stored from production (KG)?	Numeric		
462.	CROP TYPE [x]: Where were the seeds stored?	Single	1	Home
			2	Neighbour
			3	Village store
			4	Association store
			5	Warehouse receipt system
			6	Other (specify)
463.	CROP TYPE [x]: Did you have to repay seeds on credit with the crop harvested?	Single	1	Yes
			2	No
464.	CROP TYPE [x]: Who did you have to repay the seeds to?	Single	1	Trader
			2	Relative
			3	Neighbour
			4	Local market
			5	ADMARC
			6	Cooperative/association
			7	Private company

Question		Type	Answer option	
			9	ExAgris
			10	Other (specify)
465.	CROP TYPE [x]: How much seed did you RECEIVE (KG)?	Numeric		
466.	CROP TYPE [x]: What was the REPAYMENT METHOD?	Single	1	Seed
			2	Cash
			3	Ganyu
			4	Other (specify)
467.	CROP TYPE [x]: How much did you REPAY (KG of SEED/MWK paid/No. of Days Ganyu)?	Numeric		
468.	CROP TYPE [x]: Did you purchase this crop for household consumption in the past year?	Single	1	Yes
			2	No
469.	CROP TYPE [x]: Total quantity purchased (KG)?	Numeric		
470.	CROP TYPE [x]: In what months did you consume the purchased quantity?	Multiple	1	January
			2	February
			3	March
			4	April
			5	May
			6	June
			7	July
			8	August
			9	September
			10	October
			11	November
			12	December

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Question		Type	Answer option	
471.	CROP TYPE [x]: Did you borrow any this crop for household consumption in the past year?	Single	1	Yes
			2	No
472.	CROP TYPE [x]: Total quantity borrowed (KG)?	Numeric		
473.	CROP TYPE [x]: In what months did you consume the borrowed quantity?	Multiple	1	January
			2	February
			3	March
			4	April
			5	May
			6	June
			7	July
			8	August
			9	September
			10	October
			11	November
			12	December
474.	CROP TYPE [x]: From what source did you borrow?	Multiple	1	Relative
			2	Neighbour
			3	Grocery/local merchant
			4	Money lender (katapila)
			5	Employer
			6	Religious institution
			7	None
475.	CROP TYPE [x]: Did you consume from the production of neighbours or relatives?	Single	1	Yes

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Question		Type	Answer option	
			2	No
476.	CROP TYPE [x]: Please estimate the quantity consumed? (kg)	Numeric		
477.	CROP TYPE [x]: How often did you consume this crop from the production of neighbours/relatives pre harvest?	Single	1	Rarely
			2	Sometimes
			3	Often
478.	CROP TYPE [x]: How often did you consume this crop from the production of neighbours/relative's post-harvest?	Single	1	Rarely
			2	Sometimes
			3	Often
LIVESTOCK - This section is in relation to the ownership and sales of LIVESTOCK in the LAST 12 MONTHS.				
479.	Have you or any member of the household raised or owned any of the listed livestock during the past 12 months?	Multiple	1	Chicken
			2	Other poultry (specify)
			3	Goat
			4	Pig
			5	Oxen
			6	Cattle
			7	Other (specify)
			8	None (skips to next section)
480.	Livestock type [x]: How many does your household own at present?	Numeric		
481.	Livestock type [x]: If you sold one of those today how much money could you get for it? (AVERAGE MARKET PRICE)	Numeric		
482.	Livestock type [x]: How many were sold during the last 12 months?	Numeric		
483.	Livestock type [x]: How much did your household receive for the sale of all these during the last 12 months? (Include value of in-kind payments - MWK)	Numeric		
484.	Livestock type [x]: How many did you eat or kill for special occasion/meal in the last 12 months?	Numeric		

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Question		Type	Answer option	
485.	Livestock type [x]: How many died in the last 12 months?	Numeric		
486.	Livestock type [x]: How many were lost or stolen during the last 12 months?	Numeric		
487.	Livestock type [x]: How many were given away during the last 12 months?	Numeric		
488.	Livestock type [x]: How many did your household purchase during the last 12 months?	Numeric		
489.	Livestock type [x]: How much did you pay in total for those purchased during the last 12 months? (include value of in-kind payments - MWK)	Numeric		
490.	Livestock type [x]: How many were born during the last 12 months?	Numeric		
491.	Livestock type [x]: How many were received as gifts in the last 12 months?	Numeric		
492.	Livestock type [x]: How much did you spend in total on the upkeep of these over the past 12 months (e.g. feed/herd boys/vaccinations/medicine/building a Kola) (estimated value MWK)?	Numeric		
493.	Livestock type [x]: What was the fresh by-product?	Multiple	1	Eggs
			2	Milk
			3	Skin
			4	Meat
			5	Manure
			6	Other (specify)
494.	Livestock type [x]: How much did you obtain in total from the sales of these by-products during the last 12 months? (Include value of in-kind payments - MWK)	Numeric		
495.	Livestock type [x]: Who in the household makes the decision to sell this type of animal?	Single	1	Head
			2	Spouse
			3	Son/daughter
			4	Brother/sister
			5	Father/mother
			6	Son/daughter in law

Question		Type	Answer option	
			7	Orphan (below the age of 16)
			8	Orphan (above the age of 16)
			9	Grand child
			10	Other relative (specify)
			11	Whole household
496.	Livestock type [x]: Who in the household gains from the income from the sale of this type of animal?	Single	1	Head
			2	Spouse
			3	Son/daughter
			4	Brother/sister
			5	Father/mother
			6	Son/daughter in law
			7	Orphan (below the age of 16)
			8	Orphan (above the age of 16)
			9	Grand child
			10	Other relative (specify)
			11	Whole household
497.	Livestock type [x]: Who in the household makes the decision to sell by-products from this animal?	Single	1	Head
			2	Spouse
			3	Son/daughter
			4	Brother/sister
			5	Father/mother
			6	Son/daughter in law
			7	Orphan (below the age of 16)

Question		Type	Answer option	
			8	Orphan (above the age of 16)
			9	Grand child
			10	Other relative (specify)
			11	Whole household
498.	Livestock type [x]: Who in the household gains the income from the sale of by-products from this type of animal?	Single	1	Head
			2	Spouse
			3	Son/daughter
			4	Brother/sister
			5	Father/mother
			6	Son/daughter in law
			7	Orphan (below the age of 16)
			8	Orphan (above the age of 16)
			9	Grand child
			10	Other relative (specify)
			11	Whole household
Household Food Insecurity Access Scale - This section asks basic question about the household's access and availability to food over the past FOUR WEEKS (***PLEASE USE SUGGESTED PROBES and EXAMPLES when asking these questions***)				
499.	In the past four weeks did you worry that your household would not have enough food.	Single	1	Yes
			2	No
500.	How often did this happen?	Single	1	Rarely (once or twice in the past four weeks)
			2	Sometimes (three to ten times in the past four weeks)
			3	Often (more than ten times in the past four weeks)
501.		Single	1	Yes

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Question		Type	Answer option	
	In the past four weeks were you or any household member not able to eat the kinds of foods you preferred because of a lack of resources?		2	No
502.	How often did this happen?	Single	1	Rarely (once or twice in the past four weeks)
			2	Sometimes (three to ten times in the past four weeks)
			3	Often (more than ten times in the past four weeks)
503.	In the past four weeks did you or any household member have to eat a limited variety of foods due to a lack of resources?	Single	1	Yes
			2	No
504.	How often did this happen?	Single	1	Rarely (once or twice in the past four weeks)
			2	Sometimes (three to ten times in the past four weeks)
			3	Often (more than ten times in the past four weeks)
505.	In the past four weeks did you or any household member have to eat some foods that you really did not want to eat because of a lack of resources to obtain other types of food?	Single	1	Yes
			2	No
506.	How often did this happen?	Single	1	Rarely (once or twice in the past four weeks)
			2	Sometimes (three to ten times in the past four weeks)
			3	Often (more than ten times in the past four weeks)
507.	In the past four weeks did you or any household member have to eat a smaller meal than you felt you needed because there was not enough food?	Single	1	Yes
			2	No
508.	How often did this happen?	Single	1	Rarely (once or twice in the past four weeks)
			2	Sometimes (three to ten times in the past four weeks)
			3	Often (more than ten times in the past four weeks)
509.	In the past four weeks did you or any other household member have to eat fewer meals in a day because there was not enough food?	Single	1	Yes
			2	No
510.	How often did this happen?	Single	1	Rarely (once or twice in the past four weeks)
			2	Sometimes (three to ten times in the past four weeks)

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Question		Type	Answer option	
			3	Often (more than ten times in the past four weeks)
511.	In the past four weeks was there ever no food to eat of any kind in your household because of a lack of resources to get food?	Single	1	Yes
			2	No
512.	How often did this happen?	Single	1	Rarely (once or twice in the past four weeks)
			2	Sometimes (three to ten times in the past four weeks)
			3	Often (more than ten times in the past four weeks)
513.	In the past four weeks did you or any household member go to sleep at night hungry because there was not enough food?	Single	1	Yes
			2	No
514.	How often did this happen?	Single	1	Rarely (once or twice in the past four weeks)
			2	Sometimes (three to ten times in the past four weeks)
			3	Often (more than ten times in the past four weeks)
515.	In the past four weeks did you or any household member go a whole day and night without eating anything because there was not enough food?	Single	1	Yes
			2	No
516.	How often did this happen?	Single	1	Rarely (once or twice in the past four weeks)
			2	Sometimes (three to ten times in the past four weeks)
			3	Often (more than ten times in the past four weeks)
517.	Which months of the year are MOST DIFFICULT for you to access food of enough quantity and quality for your family?	Multiple	1	Jan
			2	Feb
			3	Mar
			4	Apr
			5	May
			6	Jun
			7	Jul

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Question		Type	Answer option	
			8	Aug
			9	Sep
			10	Oct
			11	Nov
			12	Dec
			13	None
518.	If last year's Maize ran out how did you obtain sufficient food for you and your family	Open		
Land Ownership and Cultivation - This section is in relation to the ownership renting in/out cultivation and access to land THIS YEAR (i.e. Rain-fed or Dimba 2012/2013)				
519.	How much land do you own (acres)?	Numeric		
520.	THIS YEAR: How much land did you cultivate in total (acres)?	Numeric		
521.	THIS YEAR: Did your household RENT OUT land for OTHER HOUSEHOLDS to cultivate?	Single	1	Yes
			2	No
522.	THIS YEAR: How much land did you RENT OUT for OTHER HOUSEHOLDS to cultivate (acres)?	Numeric		
523.	THIS YEAR: What was the value of the rental payment RECEIVED in TOTAL (include value of in-kind payments - MWK)?	Numeric		
524.	THIS YEAR: What months was it rented for?	Multiple	1	Jan
			2	Feb
			3	Mar
			4	Apr
			5	May
			6	Jun
			7	Jul
			8	Aug
			9	Sep

Question		Type	Answer option	
			10	Oct
			11	Nov
			12	Dec
525.	THIS YEAR: In the last cropping season did your household RENT IN land for OWN HOUSEHOLD cultivation?	Single	1	Yes
			2	No
526.	THIS YEAR: How much land was RENTED IN (acres)?	Numeric		
527.	THIS YEAR: What was the value of the rental payment PAID in TOTAL (include value of in-kind payments - MWK)?	Numeric		
528.	THIS YEAR: What months was it rented for?	Multiple	1	Jan
			2	Feb
			3	Mar
			4	Apr
			5	May
			6	Jun
			7	Jul
			8	Aug
			9	Sep
			10	Oct
			11	Nov
			12	Dec
529.	THIS YEAR: Did your household leave any land uncultivated OR did they give it to others to cultivate (e.g. gave to family member to use)?	Single	1	Yes
			2	No
530.	THIS YEAR: How much did you leave uncultivated (acres)?	Numeric		
531.	THIS YEAR: What was the main reason your household did not cultivate this piece of land?	Open		

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Question		Type	Answer option	
532.	THIS YEAR: Did you have access to any other land if yes specify?	Single	1	Yes (specify)
			2	No
533.	THIS YEAR: How much of this other land did you have access to (acres)?	Numeric		
CROP PRODUCTION: This section is in relation to crops that were cultivated THIS YEAR (i.e. 2012-2013)				
534.	What crops did you cultivate this year?	Multiple	2	Hybrid maize
			3	Local maize
			4	Composite maize
			5	Sorghum
			6	Cassava
			7	Common bean
			8	Ground bean
			9	Soya bean
			10	Pigeon pea
			11	Cow pea
			12	Pumpkin & pumpkin leaves
			13	Orange flesh sweet potato
			14	White flesh sweet potato
			15	Irish potato
			16	Okra
			17	Sugar cane
			18	Burley tobacco
			19	Fire cured tobacco
			20	Cotton

Question		Type	Answer option	
			21	Rice
			22	Tomato
			23	Onion
			24	Chile
			25	Paprika
			26	Millet
			27	Other (specify)
535.	CROP TYPE [x]: Was this crop inter-cropped with any other crop if so which crop?	Multiple	1	Not intercropped
			2	Hybrid maize
			3	Local maize
			4	Composite maize
			5	Sorghum
			6	Cassava
			7	Common bean
			8	Ground bean
			9	Soya bean
			10	Pigeon pea
			11	Cow pea
			12	Pumpkin & pumpkin leaves
			13	Orange flesh sweet potato
			14	White flesh sweet potato
			15	Irish potato
			16	Okra

Question		Type	Answer option	
			17	Sugar cane
			18	Burley tobacco
			19	Fire cured tobacco
			20	Cotton
			21	Rice
			22	Tomato
			23	Onion
			24	Chile
			25	Paprika
			26	Millet
			27	Other (specify)
536.	CROP TYPE [x]: Was this dimba or rain-fed?	Single	1	Dimba
			2	Rain-fed
537.	CROP TYPE [x]: Area planted (ACRES)?	Numeric		
538.	CROP TYPE [x]: What is the general texture of the soil on the plot?	Single	1	Sandy
			2	Between sandy and clay
			3	Clay
539.	CROP TYPE [x]: What is the slope of this plot?	Single	1	Flat
			2	Slight slope
			3	Moderate slope
			4	Steep/hilly
540.	CROP TYPE [x]: When Planted?	Single	1	January
			2	February

Question		Type	Answer option	
			3	March
			4	April
			5	May
			6	June
			7	July
			8	August
			9	September
			10	October
			11	November
			12	December
541.	CROP TYPE [x]: When Harvested?	Single	12	December
			11	November
			10	October
			9	September
			8	August
			7	July
			6	June
			5	May
			4	April
			3	March
			2	February
			1	January
542.	CROP TYPE [x]: Quantity harvested (KG)?	Numeric		

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Question		Type	Answer option	
543.	CROP TYPE [x]: 1st type of fertilizer;	Single	1	23:21:0+4s
			2	Compound
			3	Can
			4	Compost
			6	Manure
			7	Urea
			8	Compound d
			9	None
			10	Other (specify)
544.	CROP TYPE [x]: Quantity of 1st fertilizer (KG)?	Numeric		
545.	CROP TYPE [x]: Where did you source the 1st fertilizer?	Single	1	Trader
			2	Relative
			3	Neighbour
			4	Local market
			5	ADMARC
			6	Cooperative or association
			7	Private company
			8	Targeted input programme
			9	Ngo
			10	Other (specify)
546.	CROP TYPE [x]: 2nd type of fertilizer;	Single	1	23:21:0+4s
			2	Compound
			3	Can

Question		Type	Answer option	
			4	Compost
			5	Dap
			6	Manure
			7	Urea
			8	Compound d
			9	None
			10	Other (specify)
547.	CROP TYPE [x]: Quantity of 2nd fertilizer (KG)?	Numeric		
548.	CROP TYPE [x]: Where did you source the 2nd fertilizer?	Single	1	Trader
			2	Relative
			3	Neighbour
			4	Local market
			5	ADMARC
			6	Cooperative or association
			7	Private company
			8	Targeted input programme
			9	Ngo
			10	Other (specify)
549.	CROP TYPE [x]: How much did you pay for the fertilizer used on this crop (Estimate benefits in kind - MWK)?	Numeric		
550.	CROP TYPE [x]: Did you use your own seed or seedlings?	Single	1	Yes
			2	No
551.	CROP TYPE [x]: Quantity of own seeds/seedlings used (KG)?	Open		
552.	CROP TYPE [x]: Did you use any purchased seeds or seedlings on your land?	Single	1	Yes

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Question		Type	Answer option	
553.			2	No
554.	CROP TYPE [x]: Source of purchased seeds?	Single	1	Trader
			2	Relative
			3	Neighbour
			4	Local market
			5	ADMARC
			6	Cooperative or association
			7	Private company
			8	Targeted input programme
			9	Ngo
			10	Other (specify)
555.	CROP TYPE [x]: What was the total costs of the seed (Estimate benefits in kind - MWK)?	Numeric		
556.	CROP TYPE [x]: Quantity of seeds purchased (KG)	Numeric		
557.	CROP TYPE [x]: Did you use SEED RECEIVED ON CREDIT on your land?	Single	1	Yes
			2	No
558.	CROP TYPE [x]: Source of seeds RECEIVED ON CREDIT?	Single	1	Trader
			2	Relative
			3	Neighbour
			4	Local market
			5	ADMARC
			6	Cooperative or association
			7	Private company
			8	Targeted input programme

Question		Type	Answer option	
			9	Ngo
			10	Other (specify)
559.	CROP TYPE [x]: Quantity of seeds RECEIVED ON CREDIT?	Numeric		
560.	CROP TYPE [x]: METHOD OF REPAYMENT for seeds received on credit?	Single	1	Seed
			2	Cash
			3	Ganyu
			4	Other (specify)
561.	CROP TYPE [x]: Quantity RE-PAYED in any of the following quantities: KG for seed MWK for Cash Days for Ganyu.	Numeric		
562.	CROP TYPE [x]: Did you use any pesticides?	Single	1	Yes
			2	No
563.	CROP TYPE [x]: What type of Pesticides did you use?	Open		
564.	CROP TYPE [x]: Quantity of pesticides used (KG)?	Open		
565.	CROP TYPE [x]: Source the pesticides used?	Single	1	Trader
			2	Relative
			3	Neighbour
			4	Local market
			5	ADMARC
			6	Cooperative or association
			7	Private company
			8	Targeted input programme
			9	Ngo
			10	Other (specify)
566.	CROP TYPE [x]: Cost of Pesticides in (Estimate benefits in kind - MWK)?	Numeric		

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	Question	Type		Answer option
567.	CROP TYPE [x]: Please specify the activities undertaken throughout production of this crop	Multiple	1	Ploughing
			2	Manual land preparation
			3	Sowing
			4	Pruning
			5	Fertilising
			6	Irrigating
			7	Weeding
			8	Harvesting
			9	Post-harvest processing
568.	Activity [x] - Please specify the labour type used and the number of days of each	Multiple	1	Male family labour
			2	Female family labour
			3	Male & female family labour
			4	Hired labour
			5	Contract labour (e.g. Ploughing)
			6	Labour exchange
			7	Other
569.	CROP TYPE [x]: Total cost of hired labour (Estimate benefits in kind - MWK)?	Numeric		
570.	CROP TYPE [x]: Who makes the decisions in relation To the PLANTING of the crop?	Multiple	1	Head
			2	Spouse
			3	Son/daughter
			4	Brother/sister
			5	Father/mother
			6	Son/daughter in law

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Question		Type	Answer option	
			7	Orphan (below the age of 16)
			8	Orphan (above the age of 16)
			9	Grand child
			10	Other relative (specify)
571.	CROP TYPE [x]: Who makes the decisions in relation To the CONSUMPTION of the crop?	Multiple	1	Head
			2	Spouse
			3	Son/daughter
			4	Brother/sister
			5	Father/mother
			6	Son/daughter in law
			7	Orphan (below the age of 16)
			8	Orphan (above the age of 16)
			9	Grand child
			10	Other relative (specify)
572.	CROP TYPE [x]: Who makes the decisions in relation To the SALE of the crop?	Multiple	1	Head
			2	Spouse
			3	Son/daughter
			4	Brother/sister
			5	Father/mother
			6	Son/daughter in law
			7	Orphan (below the age of 16)
			8	Orphan (above the age of 16)
			9	Grand child

Question		Type	Answer option	
			10	Other relative (specify)
TREE CROPS - This section is in relation to TREE CROPS that were cultivated THIS YEAR (i.e. 2012-2013)				
573.	TREE CROP: Did you harvest THIS YEAR?	Single	1	Yes
			2	No
574.	TREE CROP: What type?	Multiple	5	Other (specify)
			4	Citrus
			3	Guava
			2	Papaya
			1	Banana
575.	TREE CROPS: When harvested?	Single	12	December
			11	November
			10	October
			9	September
			8	August
			7	July
			6	June
			5	May
			4	April
			3	March
			2	February
			1	January
576.	TREE CROP: Quantity harvested (KG)?	Numeric		
577.	TREE CROPS: Who makes the decisions in relation To the PLANTING of the crop?	Multiple	1	Head

Question		Type	Answer option	
			2	Spouse
			3	Son/daughter
			4	Brother/sister
			5	Father/mother
			6	Son/daughter in law
			7	Orphan (below the age of 16)
			8	Orphan (above the age of 16)
			9	Grand child
			10	Other relative (specify)
578.	TREE CROPS: Who makes the decisions in relation To the CONSUMPTION of the crop?	Multiple	1	Head
			2	Spouse
			3	Son/daughter
			4	Brother/sister
			5	Father/mother
			6	Son/daughter in law
			7	Orphan (below the age of 16)
			8	Orphan (above the age of 16)
			9	Grand child
			10	Other relative (specify)
579.	TREE CROPS: Who makes the decisions in relation To the SALE of the crop?	Multiple	1	Head
			2	Spouse
			3	Son/daughter
			4	Brother/sister

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Question		Type	Answer option	
			5	Father/mother
			6	Son/daughter in law
			7	Orphan (below the age of 16)
			8	Orphan (above the age of 16)
			9	Grand child
			10	Other relative (specify)
GROUNDNUT and AFLATOXIN MANAGEMENT (to be asked of ALL respondents)				
580.	GROUNDNUT: Are you aware of the problem of aflatoxin in groundnuts?	Single	1	Yes
			2	No
581.	GROUNDNUT: What are the effects on humans of aflatoxins?	Open		
582.	GROUNDNUT: Can you describe the FIRST technique you as a cultivator of groundnut can use to reduce or eliminate aflatoxin contamination in groundnuts?	Open		
583.	GROUNDNUT: Can you describe a SECOND technique you as a cultivator of groundnut can use to reduce or eliminate aflatoxin contamination in groundnuts?	Open		
584.	GROUNDNUT: Can you describe a THIRD technique you as a cultivator of groundnut can use to reduce or eliminate aflatoxin contamination in groundnuts?	Open		
585.	GROUNDNUT: Have you ever had groundnuts rejected by a buyer because of aflatoxin?	Single	1	Yes
			2	No
586.	GROUNDNUT: What do you do with these rejected groundnuts?	Open		
587.	GROUNDNUT: What do you do with bad groundnuts? (i.e. nuts that are rotted or have black spots)	Open		
End of survey. Thank the participant for their time. Ask them if they have any questions, make note of these.				